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American Machinist

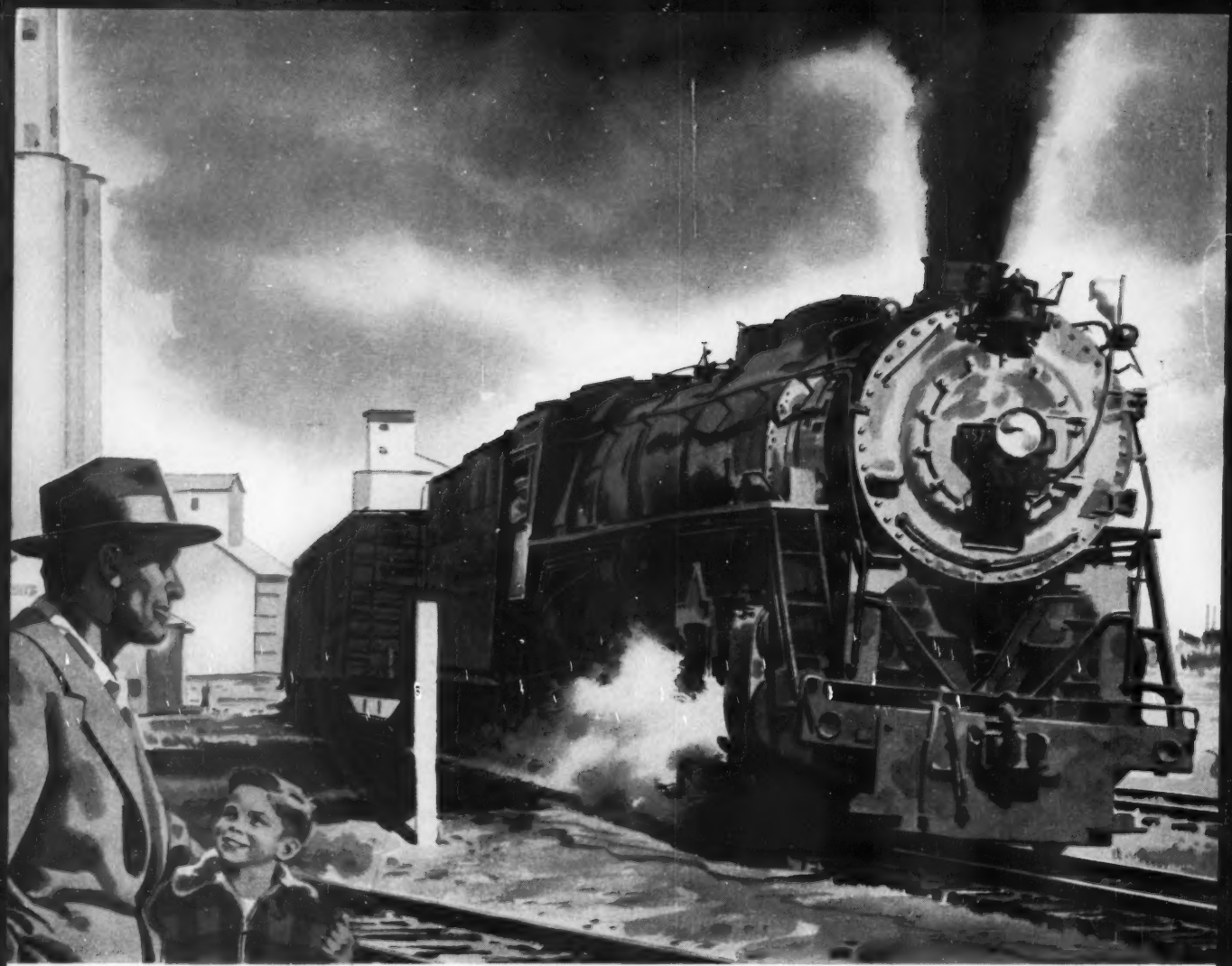
MARCH 29, 1954

McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION

Flow turning, new metalworking process
— see page 2

Hydraulic Presses—A SPECIAL REPORT

Gear-Cutting Savvy—16 Ideas



Look, Daddy—a steam engine!

THAT's right. Kind of a rare sight these days. Looks like the good old "iron horse" is headed for the last round-up.

Why? Competition mostly. Something *better* came along. Locomotives that were more efficient—less costly to operate and maintain. That's the way it goes. Competition means progress for some things, obsolescence for others.

Naturally you want *your product* to be a success in the competitive days ahead. So you're probably looking right now for new ways to improve quality and cut production costs. That's where we here at Heald may be able to help. New Heald developments in automation, battery-type equipment, way-type and transfer-type Bore-Matics, plus a number of advanced design features, can now be applied to a wide variety of jobs. We'd like to show you what a fresh Heald viewpoint and latest Heald equipment can do—on long or short runs, single or multi-purpose setups.

Competition is wonderful when you're *ahead* of it. Our business is to keep you there. That's why IT PAYS TO COME TO HEALD.

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NUMBER OF COPIES PRINTED THIS ISSUE 36,432

chips

ROLL FLOWING . . . Our front-cover picture does *not* show spinning—it is a new process somewhat akin that Lodge & Shipley Company has named "Floturn." Cones and cylinders, simple or complex, are "flowed" by a pressure roller that thins the metal up to 75% in one pass, and makes it flow up the mandrel. The process starts with a flat-rolled or machined blank, saves material waste, permits economical shaping of parts that would otherwise require many operations and expensive tooling. An engineering explanation of the process is given by Claus L Sporck (see biog), research & development engineer. The machine itself is described in the "New Shop Equipment, Materials and Parts" department.

HYDRAULIC PRESSES . . . When we published "How Modern Mechanical Presses Operate" (*AM*—Nov 17 '49) as a 16-page Special Report, readers were given, perhaps for the first time, an insight into construction features and applications of various press types in use. We tried, at that time, to put together a similar report on hydraulic presses, but failed. Now H D Thweatt, vice-president of Lake Erie Engrg Corp, has given us our current 12-page Special Report on "How to Choose Hydraulic Presses for Metal-Forming Operations"—which does the job we've wanted to do for 4½ years. The report discusses how hydraulic presses are made, their control, and how to select for various applications. With recent rises in hydraulic-press use, shown in our current inventory, this should be very timely.

GEAR CUTTING . . . Richard S Hildreth of Michigan Tool Co has put together a fundamental article on principles of gear cutting, showing each process, explaining it, and indicating its best applications. We have converted it into a picture presentation to broaden the background of the production man not very familiar with gear cutting. It gives the story in 16 easy steps.

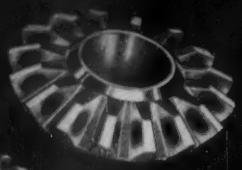
ASSEMBLY . . . Occasionally, we step outside the US for a good case study. This issue includes one on assembly of large diesel pistons, from an English company, includes an assembly carousel and flow-line techniques. March 15 *AM* had a machining story from the same plant.

AUTOMATION . . . Two standard lathes have been connected by automation to turn out auto cam shafts. Features are a backlog between machines and no interference at the operator's position. Details are in 4 pages of pictures.

COMING . . . April 12 *AM* will be our Tool Show Number, and we promise the usual surprises. Call the subject "Tooling for Tomorrow," and you can guess what's coming in it. Remote-controlled machine tools, carbide burs doing grinding jobs, aerated coolants, machine tools on tracks, arc machining, automation for the small shop—these are among the subjects to be covered. There'll be a program, list of exhibitors and descriptions of new equipment to be shown at the Show, as well.

CLAUS L SPORCK . . . A native of Trondhjem, Norway, he studied mechanical engineering at the Technical Institute of Trondhjem where he matriculated as an engineer. He did post-graduate work in metallurgy and mechanical engineering at the Technical University of Berlin, Germany, where he completed his formal education. Employed for 8 years by the Sandvik Steel Co of Sandviken, Sweden, in various capacities of engineering, including work in metallurgy, design, processing and production.

Took up permanent residence after serving 4 years as officer in the Royal Norwegian Air Force. Became naturalized citizen in 1950. Joined the Lodge & Shipley Company early in 1953 to assume the duties of chief design engineer for the Floturn lathe.



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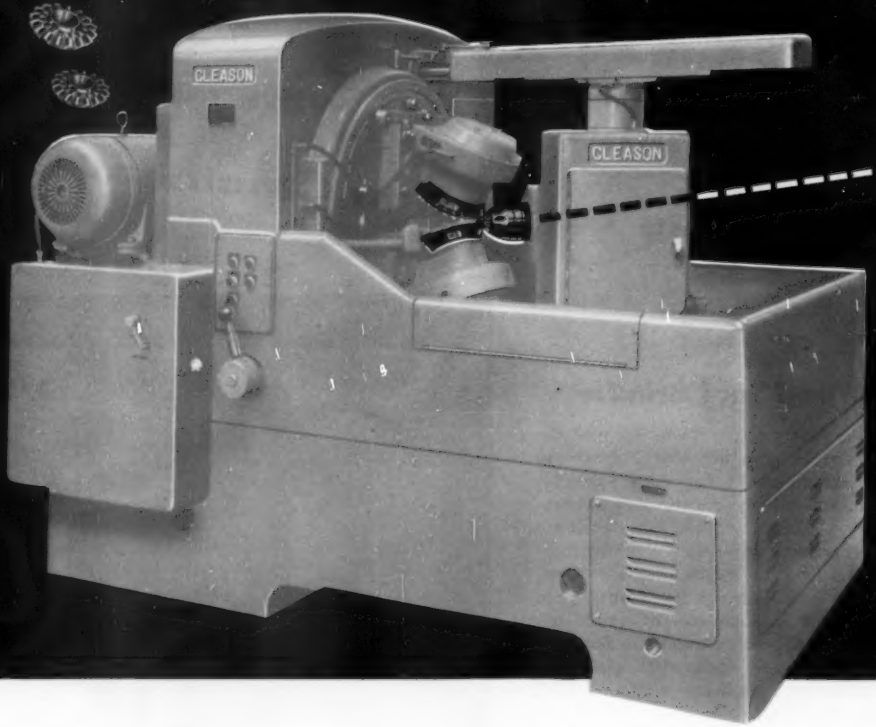

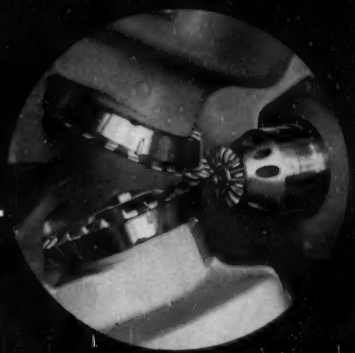

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Continuous Cutting Action

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MORE PRODUCTION

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No. 104 Cutter Sharpener: Fully automatic wet grinding—angles easily set and maintained—simplified set-up and changeover.

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Operation Profit—
Maintained Easier with
Cutting Tools Ground on Cincinnatis

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Cutter and Tool Grinder

Versatility and wide range, combined with accuracy and speed, give the No. 2 machines the highest endorsement for cutter maintenance in metalworking shops everywhere. Work height is fixed . . . the table rolls on balls between hardened ways . . . the grinding wheel spindle runs on anti-friction bearings contained in a cartridge . . . table ways and spindle unit replaceable at small expense. Power feed to table available for toolroom work. Swing over table, 10" diameter; maximum distance between centers, 27". Catalog No. M-1734.

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THE CINCINNATI MILLING MACHINE CO., CINCINNATI 9, OHIO

MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING MACHINES • METAL FORMING

PROJECTO-FORM
Grinding Machine

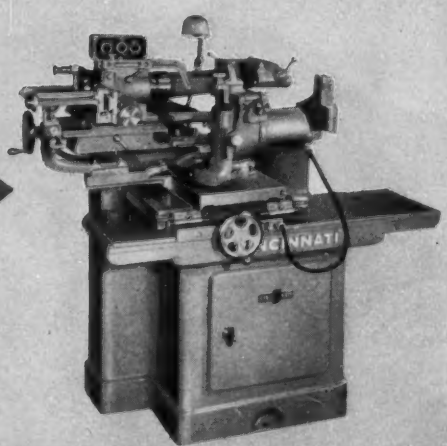
For grinding small, accurate profile shapes on flat form cutters, lamination die parts and similar components. This machine combines grinding with an optical comparator unit. Work profile is enlarged 20 X on ground glass viewing screen directly in front of operator. Master drawings made on Layout Scribing Machine. Catalog No. M-1612-4.

MONOSET
Cutter and Tool Grinder

For sharpening, repairing, and making small cutters including countersinks, those required for die sinking, and other unusual shapes. Because of the universal construction, most jobs can be completed in one chucking. Built-in spiral lead mechanism generates infinitely variable helices, right- or left-hand, $1\frac{13}{16}$" min. lead. Catalog No. M-1591-2.

CONTOUR
Cutter Sharpening Machine

This machine offers a big saving for shops having a volume of form milling operations. It grinds form milling cutters on the periphery of the teeth to a definite cutting clearance chosen for the work material. Contour ground cutters produce a greatly superior finish at a higher feed rate. Catalog No. M-1552-1.

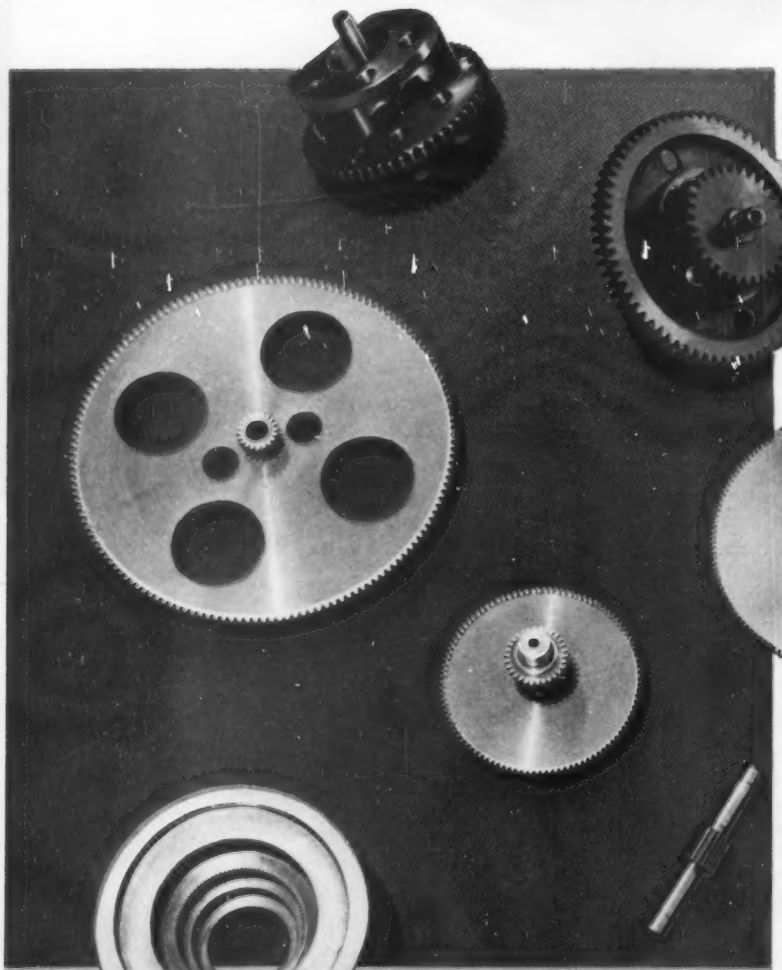


MACHINES • FLAME HARDENING MACHINES • OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

HOW 'MANHATTAN GEAR' MEETS SPECIFICATIONS ... EVEN TO .0003"

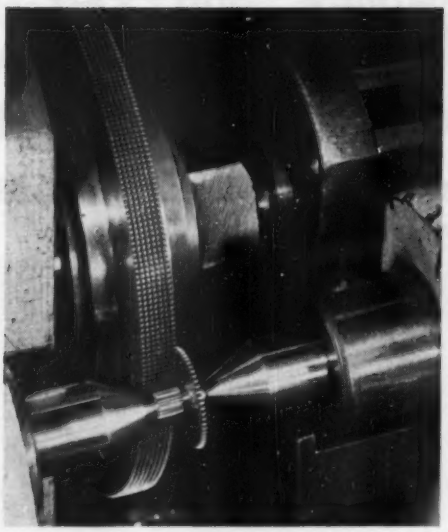
Fundamental Control

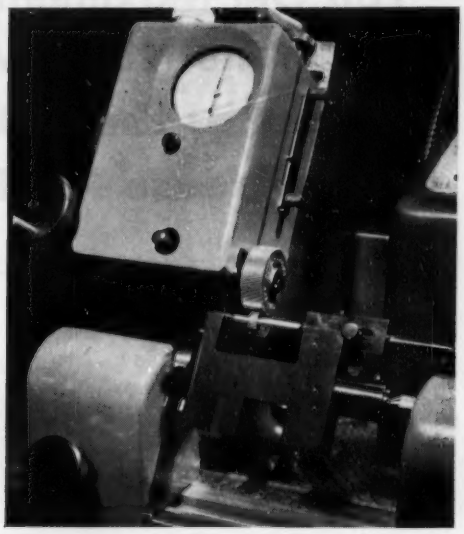
has always been the basic reason for a precision manufacturer's dependence on Fellows equipment. The generating principle coupled with the super-accuracy of Fellows cutters will more than meet the demand for accuracy *and* production speed in your shop. As shown here, the Fellows 3-Inch Fine-Pitch Gear Shaper is the first step in meeting the closest specifications.



Manhattan Gear and Machine Company, Brooklyn, N.Y. are *precision* gear specialists who put *precision* first. Quite naturally they get many 'real tough' gear production problems. Their record of customer satisfaction speaks well for Manhattan's men and machines.

THE Fellows





Close-Limit Tolerances

are further assured by finishing on a Fellows #4 Fine-Pitch Gear Shaving Machine, which provides the final touch to the smoothness and accuracy so vital to the exacting requirements for small precision gears running in combination.

Proof Positive

is now possible with the advent of the new Fellows #4 Fine-Pitch Red Liner. Chart-recorded inspections show composite errors, magnified up to 800 times, assures this manufacturer's fine quality control.

• *Write the nearest Fellows office for complete descriptive information on the Fine-Pitch team including the newest member, the Fellows #4 Fine-Pitch Red Liner.*

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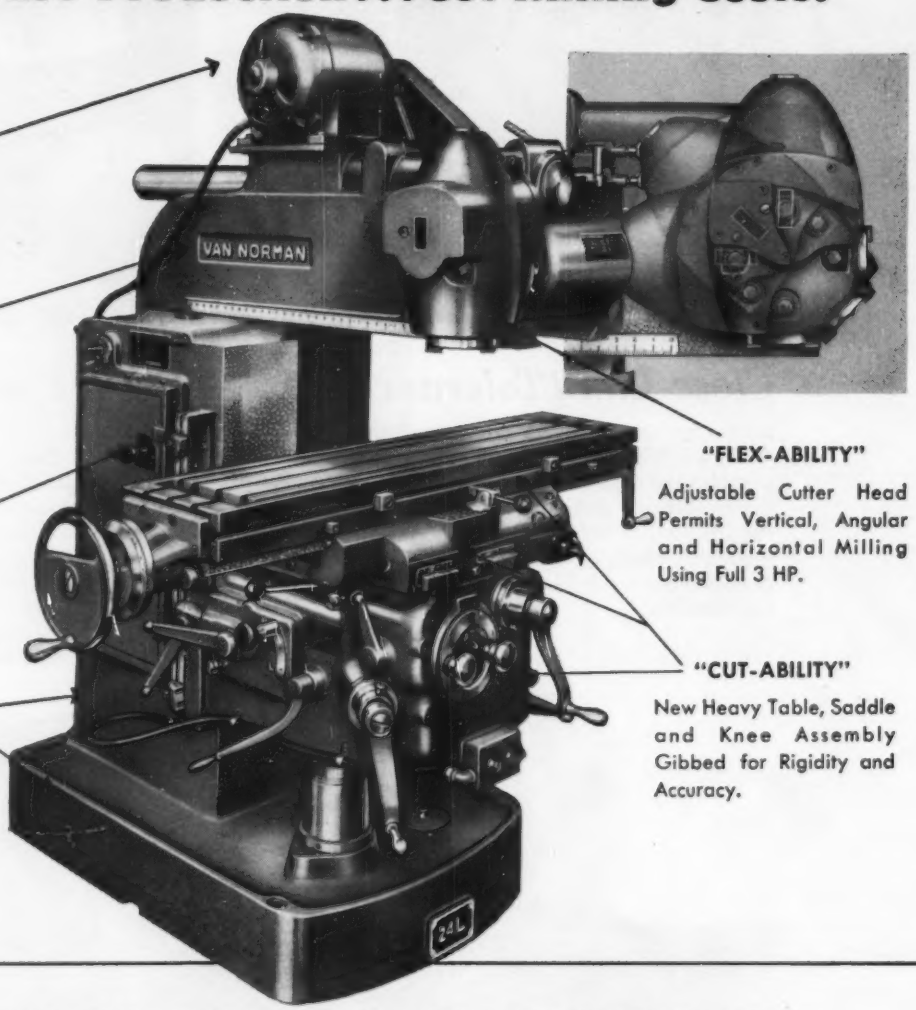
3HP Motor Drives Cutter Head Only.

"FLEX-ABILITY"
New Extended Ram with Large Ways, Permits Increased Range — Ram Travel 29".

"FLEX-ABILITY"
New Motor Controls with Single Lever Selector Switch.

"CUT-ABILITY"
New Larger Box Type Column Provides Maximum Rigidity. New Heavy Base Has Larger Coolant Reservoir.



"FLEX-ABILITY"
Adjustable Cutter Head Permits Vertical, Angular and Horizontal Milling Using Full 3 HP.

"CUT-ABILITY"
New Heavy Table, Saddle and Knee Assembly Gibbed for Rigidity and Accuracy.

Extra Features that Add to the "Cut-Ability" and "Flex-Ability" of the No. 24L Miller

New heavy motorized knee with direct drive feed motor mounted on knee.

"Start-Stop" buttons operate on 110 volts provided at front and rear with single lever selector switch to control use of motors.

Front and rear controls are directional . . . operate in the direction of desired table, saddle or knee movement. Exclusive Van Norman speed and feed selectors.

Write for more information about the new Van Norman Ram Type Millers.

VAN NORMAN Manufacturers of — Ram and Column Type Milling Machines, Cylindrical Grinders, Spline and Gear Grinders, Oscillating Radius Grinders, Special Production Grinders, Centerless Grinders.

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Grinders Give Top Production Output

. . . Lowest "Cost-Per-Piece" Grinding

Van Norman Production Grinder designed for Plunge-Cut Grinding.

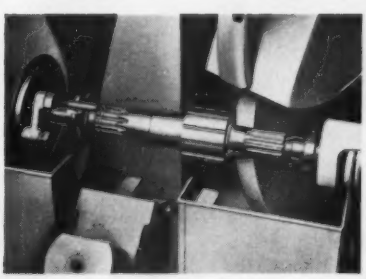
You just can't beat Van Norman Special Cylindrical Grinders for fast, economical mass production.

Van Norman designs and builds these grinders to meet your exacting requirements. Its experience in manufacturing production grinding machines since 1912 assures the utmost in performance.

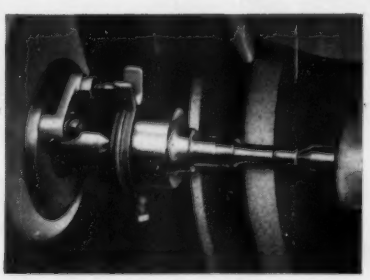
Illustrated is a typical Van Norman special production grinder designed for a major industry. Day after day this and similar production grinders are showing substantial savings by keeping production up and costs down.

If you have a mass production grinding problem, let Van Norman help you solve it. Write Van Norman Company, Springfield 7, Massachusetts.

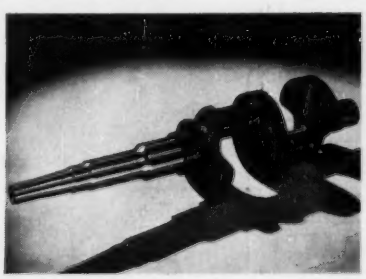
EXAMPLES OF WORK BEING MASS PRODUCED ON SPECIAL VAN NORMAN GRINDERS



Grinding a diameter and a face on a transmission shaft.



Plunge-Cut Grinding a spindle with two spaced wheels.



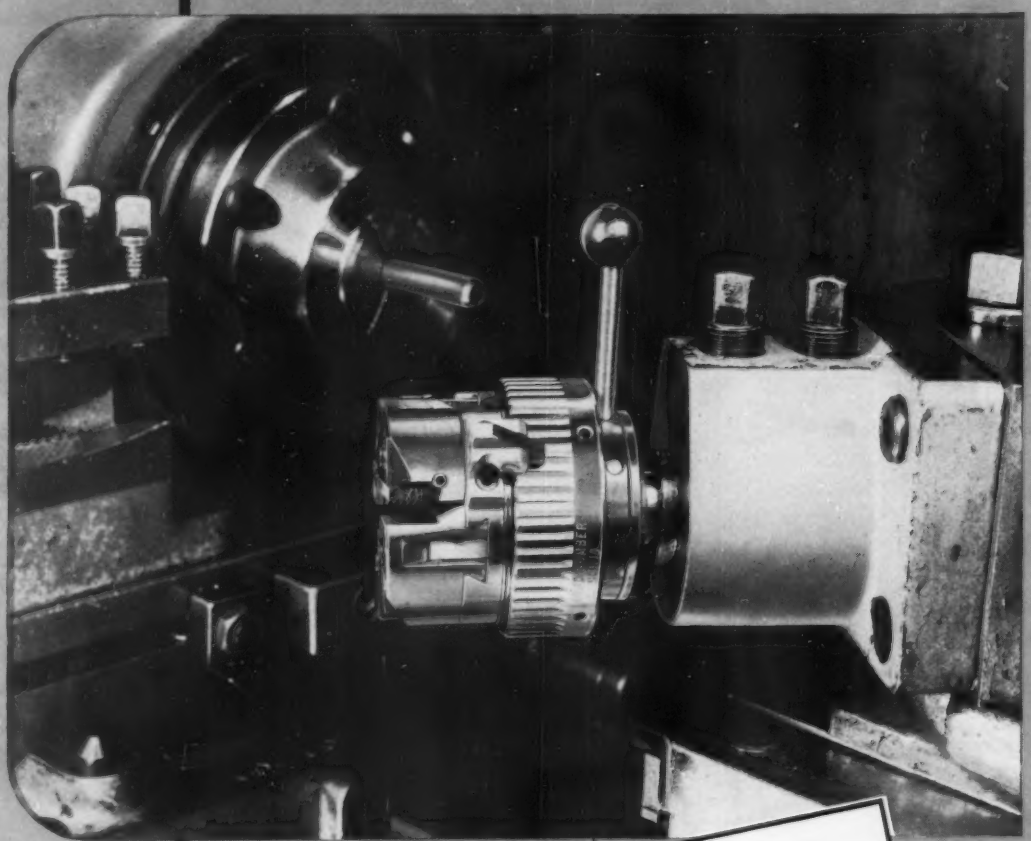
Multiple diameters, shoulders and tapers on this crankshaft are ground on double head special Van Norman Grinder.

VAN NORMAN CO., Springfield 7, Mass.

For Precision Threading on TURRET LATHES

The IMPROVED

• POSITIVE
• MORE RIGID



see this EQUIPMENT at the ASTE Show BOOTH 1738

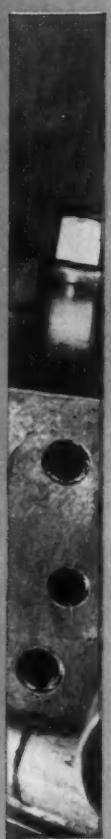
THE WORLD'S LARGEST

LANDIS Machine COMPANY

WAYNESBORO, PENNSYLVANIA, U. S. A.

5/8" LANDMATIC HEAD

LOCKING ACTION CONSTRUCTION



AN improved *LANDMATIC* Hardened and Ground threading head has been designed for use on turret lathes, hand-operated screw machines, and automatic screw machines employing a stationary head. The 5HH *LANDMATIC* is a stationary self-opening head, and will produce threads ranging from 1/4" to 5/8" in diameter. Its construction features two important improvements in design—a positive locking action, and greater head strength.

The positive locking action is provided by a new size-adjustment mechanism. A pivoted latch is held in engagement with notches on the adjustment ring by spring tension. A movement of one notch makes a corresponding adjustment of .001" on the pitch diameter of the workpiece.

The greater overall strength of this die head results from the increased thickness of the head body and its various parts. The new design allows this small die head to easily withstand the extreme stresses imposed when threading special alloy steels.

The 5HH *LANDMATIC* Head has a notably small number of working parts. All parts are made of special alloy steel, and are hardened and precision ground. Left-hand threads may be cut by using left-hand chaser holders and regrinding the same set of chasers. More information available on request.

EXCLUSIVE MANUFACTURERS OF THREAD GENERATING EQUIPMENT

Bring Costs Down

with this 4" Plain grinder

4" x 16" Type H Plain Grinder

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Gives you all these cost-cutting benefits

- Reduces costs for large or small quantities
- Ease of set-up
- Precision performance
- Ease of operation

...because of these cost-cutting features

- Variable Speed—Dial Control
  - Work Rotation
  - Work Traverse
  - Wheel Feed
- Automatic Grinding Cycle

LANDIS[174]

precision grinders

LANDIS TOOL COMPANY / WAYNESBORO, PENNA., U.S.A.

Flame-hardened and ways are standard

• Here, a skilled G&L craftsman, using G&L developed equipment, flame-hardens ways for a 30 Series machine. The greater hardness helps maintain the higher, longer-lived machining accuracy you get with G&L machines.

precision-ground on the G&L 30 Series

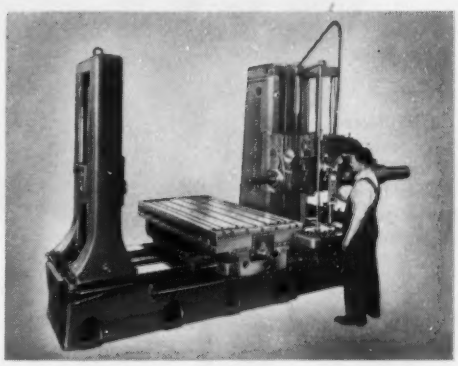
Hardened and ground bed and saddle ways are only one of the many plus features that are standard equipment on the G & L 30 Series table type Horizontals

IF you're searching for a horizontal boring, drilling and milling machine to handle large or small work, simple or complex set-ups, long or short runs — it will pay you to find out about the G&L 30 Series.

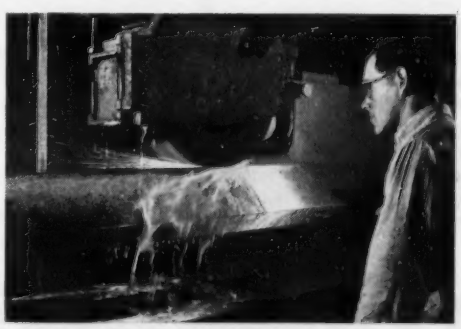
You'll discover that 30 Series machines allow you to perform boring, drilling and milling with equally high efficiency. You'll see, too, that no other machine on the market today offers you so many distinct performance and capacity boosting features as standard equipment.

Here are only a few of them — 45 all-geared spindle speeds in fine increments, 36 feeds, positive gear drive for heavier cuts, rapid change of feeds and speeds with full horsepower in the higher speed ranges.

Your investigation will convince you that a 30 Series machine is in a class by itself — often copied, never equaled. For complete details, see your G&L representative or write for the new 30 Series catalog.



There are two basic models in the 30 Series — the 340-T with 4" spindle and 20 hp, the 350-T with 5" spindle and 25 hp. Both machines offer a choice of three basic arrangements of table and saddle.



Hardened ways for bed and saddle are micro-finish ground, feature exceptionally accurate alignment.

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FOND DU LAC, WISCONSIN

Builders of the world's finest heavy-duty machine tools — Horizontal Boring, Drilling and Milling Machines — table, floor and planer types; Hypro Double Housing and Openside Planers; Planer Type Milling Machines and Vertical Boring Mills; and Davis Cutting Tools

VK HIGH SPEED STEEL

THREAD MEASURING WIRES

...basic tools in a universally accepted method of checking screw threads

VK Set No. 20 HS Thread Measuring Wires, accurate to ±.000025" for 20 common pitch Unified and American screw threads, 6 to 36 threads per inch.

The three-wire method is probably the best known and most widely accepted system of measuring pitch diameter of screw threads. Equipment required includes only a set of VK Thread Measuring Wires of proper diameter and an accurate measuring instrument.

Van Keuren Thread Measuring Wires have been developed over a period of many years of pioneering in the precise measurement field. They are made to National Bureau of Standards specifications, are held within .00002" for roundness, straightness and identity and to within .000025" of exact size.

VK Thread Measuring Wires are made of long-wearing, tough and beautifully finished high speed steel and are either 1⅞" or 2" in length. Every wire is subjected to the closest criteria in today's standards of accuracy.

In addition to set No. 20, shown here, VK furnishes many other standard sets as well as special wires in diameters from .001" to 1.500."

The Van Keuren Catalog and Handbook No. 35 contains 91 pages of technical and engineering information on wire measurement of screw threads. This information, compiled from many years research in the field, is available without charge by addressing: The Van Keuren Co., 173 Waltham St., Watertown, Mass.

VK 35th YEAR

THE Van Keuren CO.,

173 WALTHAM STREET, WATERTOWN, MASS.

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Cemented Carbide Plug Gages • Carboloy Cemented Carbide Measuring Wires • Chrome Carbide Taper Insert Plug Gages

WHEN YOU BUY SHEAVES...

Get All These Features!

ALL SHEAVES ARE NOT ALIKE. ONLY *Magic-Grip* SHEAVES COMBINE ALL THESE IMPORTANT FEATURES:

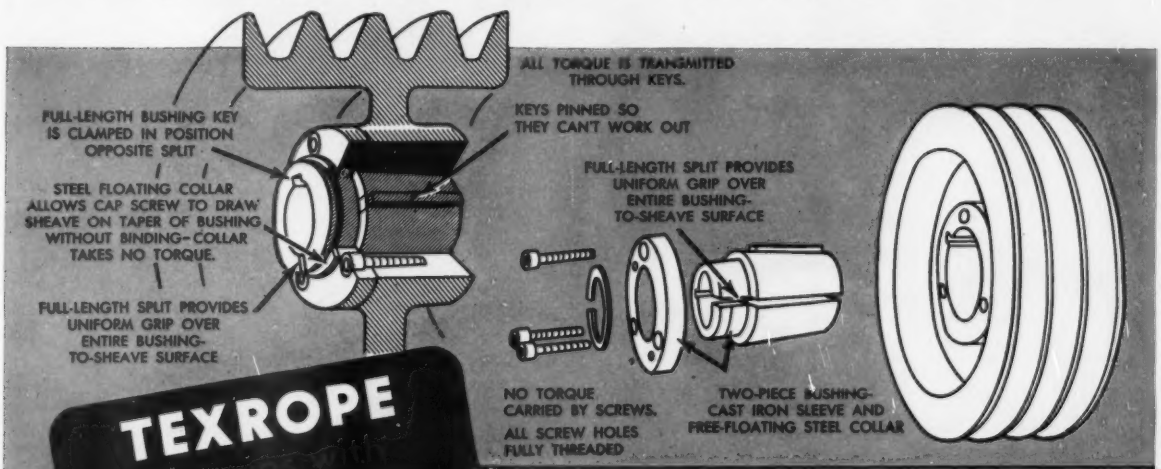
1 Full-length contact between bushing and shaft. Bushing is slit full length instead of part way. Result — when tapered bushing is slid into tapered sheave bore, pressure is applied equally all around bushing along full length. Sheave can't get out of alignment or develop excessive runout.

2 Full-key drive — Torque between bushing and shaft, and between bushing and sheave is transmitted by keys instead of threaded screws. Jamming of screws from shock overloads eliminated.

3 One-piece mounting — *Magic-Grip* sheave installs as a unit instead of in two pieces. Simply slip sheave on shaft and tighten cap screws. Complete sheave can be moved back and forth on shaft to adjust position.

4 Full-threaded screws — Cap screws in *Magic-Grip* sheaves engage a full thread — instead of a partial thread. Stripping and jamming problems eliminated!

Texrope and Magic-Grip are Allis-Chalmers trademarks.


FULL-LENGTH BUSHING KEY IS CLAMPED IN POSITION OPPOSITE SPLIT
STEEL FLOATING COLLAR ALLOWS CAP SCREW TO DRAW SHEAVE ON TAPER OF BUSHING WITHOUT BINDING—COLLAR TAKES NO TORQUE.
FULL-LENGTH SPLIT PROVIDES UNIFORM GRIP OVER ENTIRE BUSHING-TO-SHEAVE SURFACE
ALL TORQUE IS TRANSMITTED THROUGH KEYS.
KEYS PINNED SO THEY CAN'T WORK OUT
FULL-LENGTH SPLIT PROVIDES UNIFORM GRIP OVER ENTIRE BUSHING-TO-SHEAVE SURFACE
NO TORQUE CARRIED BY SCREWS.
ALL SCREW HOLES FULLY THREADED
TWO-PIECE BUSHING—CAST IRON SLEEVE AND FREE-FLOATING STEEL COLLAR
TEXROPE
Sheaves with
Magic-Grip
Bushings

All Allis-Chalmers sheaves available with *Magic-Grip* bushing.

Get more information on the fastest mounting sheave on the market. Call your nearby A-C distributor or district office. Or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-4278

Here's Comparison of *Magic-Grip* Sheave and Other Sheaves

	Magic-Grip Sheaves	SHEAVE A	SHEAVE B	SHEAVE C
Bushing fully split for uniform clamping action.	Yes	Yes	No	Yes
Load carried by keys instead of threaded bolts.	Yes	No	No	No
Bushings cover full range of NEMA "probable" shaft diameters.	Yes	Yes	Yes	No
All screws engage full thread.	Yes	Yes	Yes	No
Mounts in one piece.	Yes	No	Yes	Yes
Squares itself with shaft.	Yes	No	No	No

ALLIS-CHALMERS

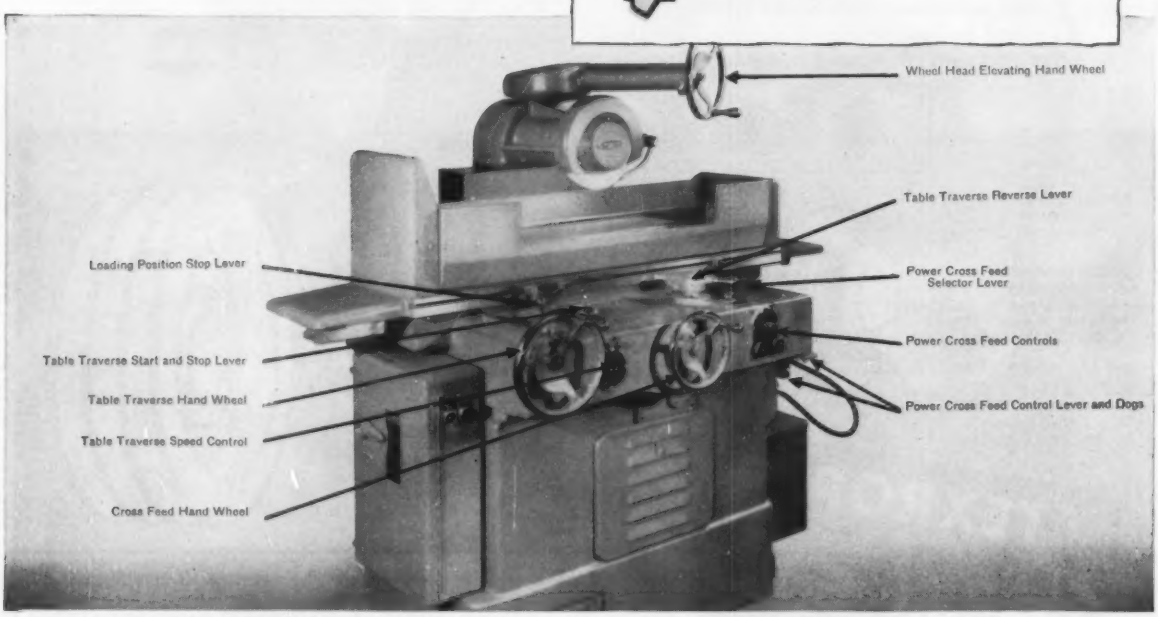
Easy to set up...
Easy to operate...

This 8" Norton Surface Grinder gives you the

"TOUCH OF GOLD"

on all kinds of jobs!

☑ *production or tool room*
☑ *military or civilian*


Wheel Head Elevating Hand Wheel
Table Traverse Reverse Lever
Loading Position Stop Lever
Power Cross Feed Selector Lever
Power Cross Feed Controls
Table Traverse Start and Stop Lever
Table Traverse Hand Wheel
Power Cross Feed Control Lever and Dogs
Table Traverse Speed Control
Cross Feed Hand Wheel

NOTE SIMPLICITY AND CONVENIENT GROUPING of controls on the Norton 8" x 24" surface grinder. Quick set up cuts your unit costs . . . makes "breaking in" of new production help far easier. It gives you the "Touch of Gold"

Here's a rugged machine with the real value-adding "Touch of Gold". It sets up quickly for a production run and maintains accuracy on quantity parts. But it's also efficient for grinding a variety of small units in tool room work. Its quick set up saves you time from job to job!

On a Norton Grinding Machine every touch of the wheel on the work is a "Touch of Gold" that gives you more value and profits. Investigate this great new grinder and its companion machines, the Norton 6" and 10" hydraulic surface grinders.

Remember — only Norton offers you such long experience in both grinding machines and wheels to help you produce more at lower cost. And Norton also offers you the world's most complete line of grinding machines.

We'll be glad to discuss your present problems or your plans for "post emergency" production, fitting tentative delivery schedules into your future plans.

Write for 12-Page Catalog 190 describing the Norton 8" x 24" surface grinder. NORTON COMPANY, Machine Division, Worcester 6, Mass. *In Canada:* J. H. Ryder Machinery Co., Ltd., Toronto 5.

To Economize, Modernize With **NEW**

NORTON

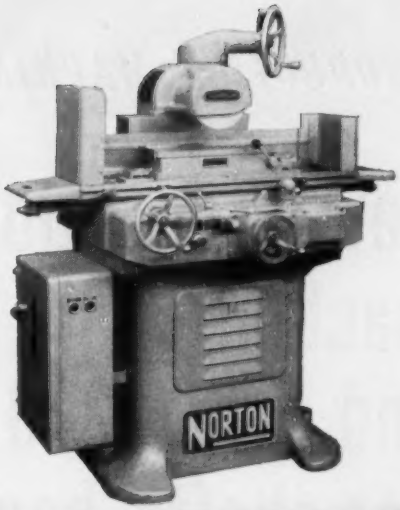
GRINDERS and LAPPERS

Making better products to make other products better

District Sales Offices: Hartford • New York • Cleveland • Chicago • Detroit

In your smaller surface grinding jobs . . .

Get the speed-plus-accuracy that means the "TOUCH of GOLD" with this Norton 6″ x 18″



Fast! . . . Accurate! The Norton 6″ x 18″ hydraulic surface grinder helps you produce more at lower cost — your profit-building "Touch of Gold."

Rapid, precise operation is one of the built-in advantages of the Norton 6″ x 18″ hydraulic surface grinder. That's why you can always count on it for accurate plane surfaces in less grinding time — the product-improving, cost-cutting "Touch of Gold" that means more and better grinding for less money.

It will pay you to learn more about its many advanced features that step up performance to *extra* efficiency and economy. Ask your Norton Representative for the whole story. Meanwhile, write us direct for Catalog No. 954. *And keep this in mind — only Norton offers you such long experience in both grinding wheels and machines.*

NORTON COMPANY, Worcester 6, Mass.

To Economize, Modernize With NEW

NORTON

GRINDERS and LAPPERS

Making better products . . . to make other products better

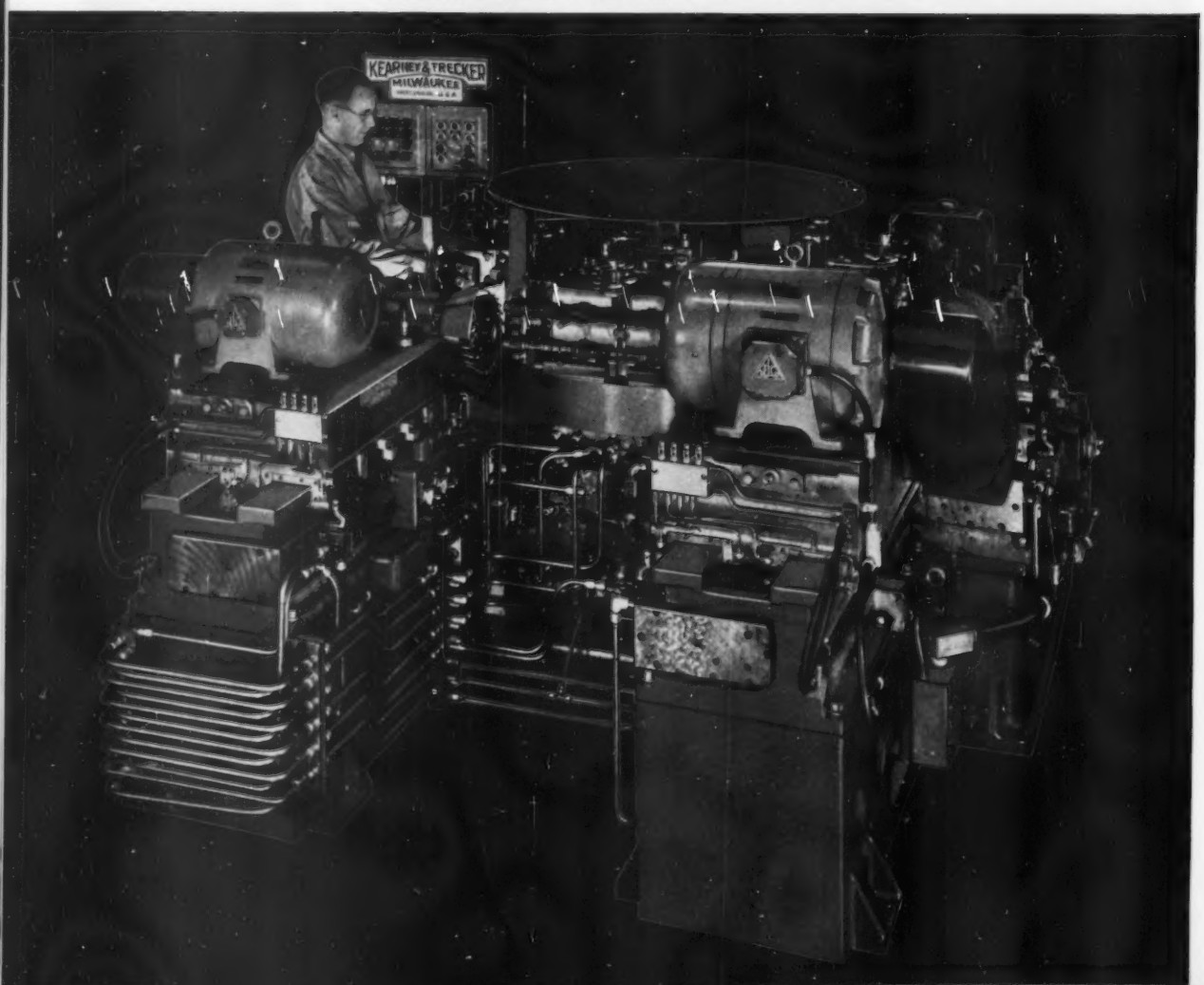
District Sales Offices: Hartford • New York • Cleveland • Chicago • Detroit • *In Canada:* J. H. Ryder Machinery Co., Ltd., Toronto 5, Ontario

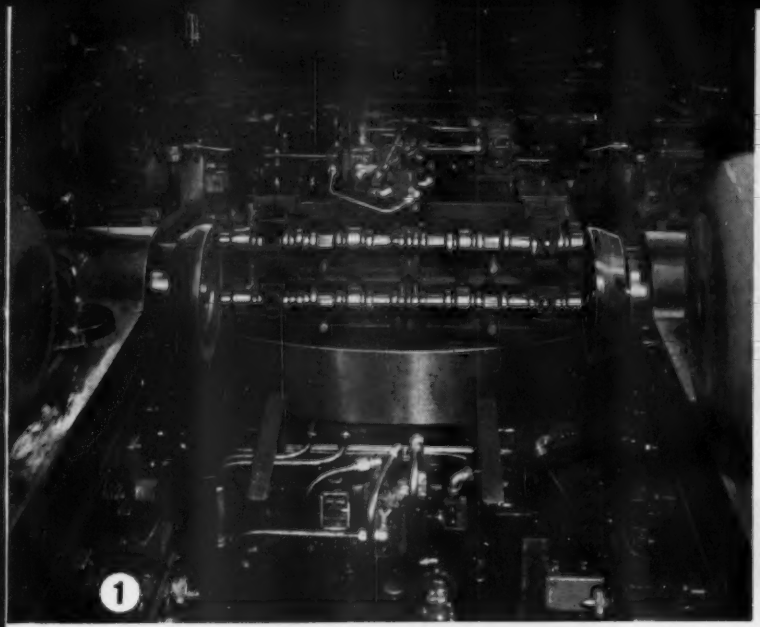
PRODUCTION MACHINING REPORT:

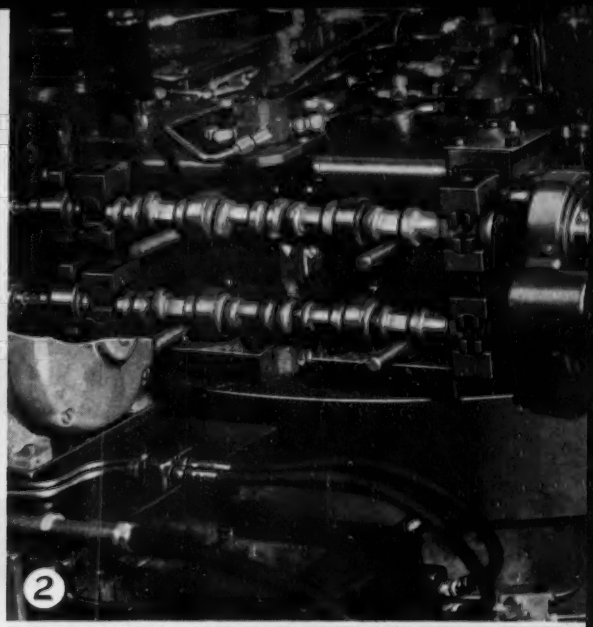
New production machine mills and drills 288 camshafts hourly

THREE of these high production, four-station rotary indexing machines were recently installed by one of the world's largest automotive manufacturers. A particularly interesting aspect of the machines — which were designed and built by Kearney & Trecker — is the fact that standard units were utilized wherever possible. This not only moved up the delivery date, but also resulted in a dramatic saving in cost. See photos 1, 2 and 3 for the sequence of operations which results in production of 288 cast iron camshafts per hour per machine.

Basically, the machine is comprised of a 60" rotary indexing table and base . . . two milling units, each with one spindle . . . one drilling unit with two spindles . . . and a second drilling unit with four spindles.





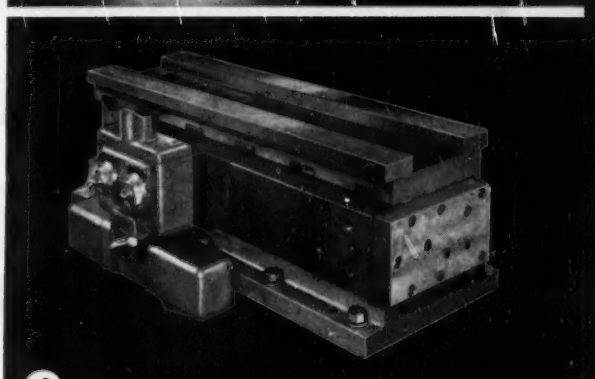


1. After 2 workpieces have been manually loaded, table indexes automatically to station 2, where both ends are milled to length. Each milling unit has a 10" dia. face mill with 36 T.C. inserted blades. Left hand head is powered by a 7½ hp motor. Right hand head by a 10 hp motor.

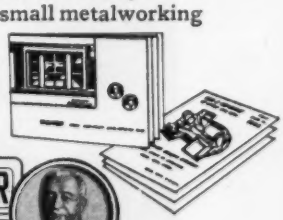
2. Table automatically indexes to drilling station and camshafts are center-drilled on each end. Drilling units are powered by a 1 hp motor. (Motor partially cut away to show drilling). Each of 4 hydraulic clamping and equalizing fixtures holds 2 workpieces. Location of workpiece is taken from end body diameters with end location from the center bearing.

3. At the final station there is a 2 hp drilling head which carries 4 spindles. Two drive holes are drilled in one end of each camshaft. Spindles operate at fixed speeds.

4. Here are two of the components which make major contributions to the machine's performance at reasonable cost. TOP: This is the feed slide unit. It is available in four standard sizes. All sizes feature a hydraulic control panel which can be mounted at either side... hardened and ground ways... a massive one-piece base casting which absorbs vibration. BOTTOM: This 60" rotary indexing table is one of four standard sizes available. Each table can be arranged for any practical number of indexes or for continuous rotary feed.



For more comprehensive facts on this machine and its standard units, write for Data Sheets No. 1018, No. 1019 and No. 1020. For details on the facilities and engineering services offered by our recently expanded Special Machinery Division, see your representative or write for booklet, "Doorway to a proven method for solving big or small metalworking problems." Kearney & Trecker Corp., 6784 West National Ave., Milwaukee 14, Wisconsin.

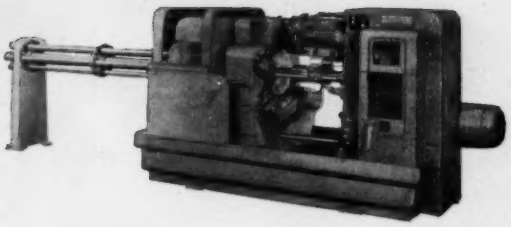


KEARNEY & TRECKER
CORPORATION
Special Machinery Division
MILWAUKEE 14, WIS., U. S. A.

NO CAM WORRIES

with Warner & Swasey
Multi-Spindle Automatics

YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY



Automatic Bar Machines — 1¾″ Standard Capacity
2¼″ Oversize Capacity

and now, newly introduced

¾″ Bar Capacity
1¼″ Bar Capacity

Automatic Chucking Machine — 6″ Swing

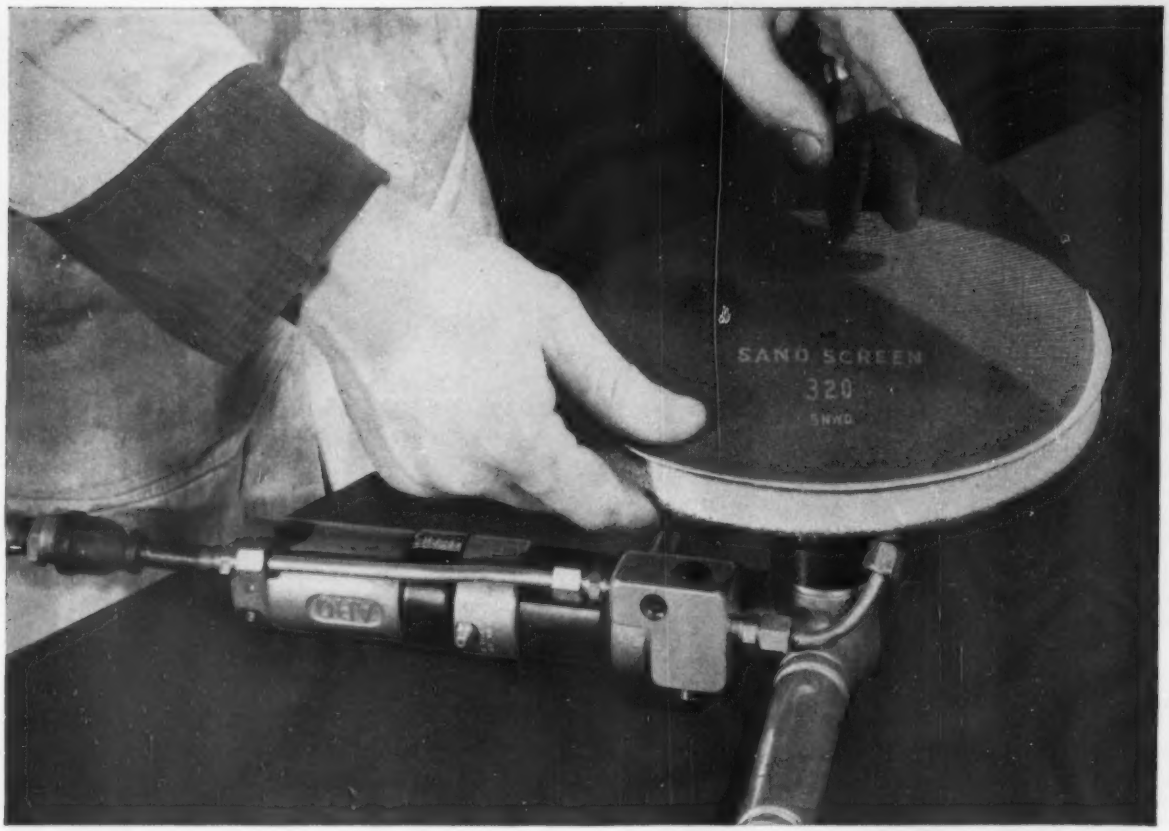
● Just make a simple setting on a Warner & Swasey—and there you have your new feed stroke, clearly indicated on a graduated scale. Yes, it's as easy as that! All feed strokes are quickly available for both longitudinal and cross slides. No more need to sacrifice cycle time because the "right" cam is not on hand or because a cam change would take too long. You always get your exact feed stroke quickly on Warner & Swasey Multi-Spindle Automatics.

NO CAMS TO CHANGE

IT'S SIMPLE TO SET UP!

WARNER & SWASEY
Cleveland
PRECISION MACHINERY SINCE 1880

MACHINE TOOLS, TEXTILE MACHINERY, CONSTRUCTION MACHINERY



● DISCS cut fast...on the FASTCUT Pad 85 Assembly

NEW SAND SCREEN: Use both

TRADE MARK

SAND SCREEN by CARBORUNDUM is the new, open-mesh abrasive cloth for sanding and finishing that lets the removed material flow right through... instead of loading and glazing, as conventional abrasive paper and cloth do.

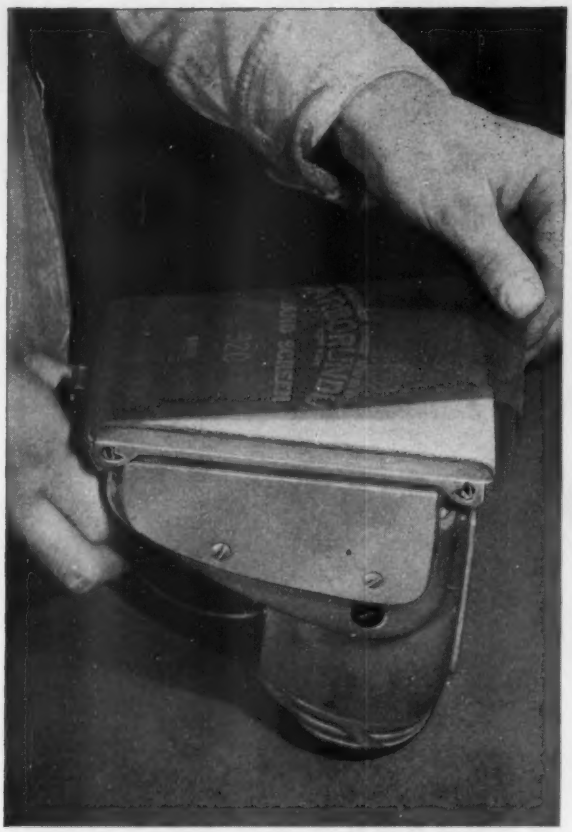
LASTS 7 TO 15 TIMES LONGER

Because it resists loading, and because you use *both sides*, SAND SCREEN sticks to its cutting job as much as 7 to 15 times longer than conventional abrasives. Both sides are uniformly coated with hard, sharp CARBORUNDUM® Brand Silicon Carbide abrasive grain for fast, easy sanding on metals, wood, paint undercoats and sealers.

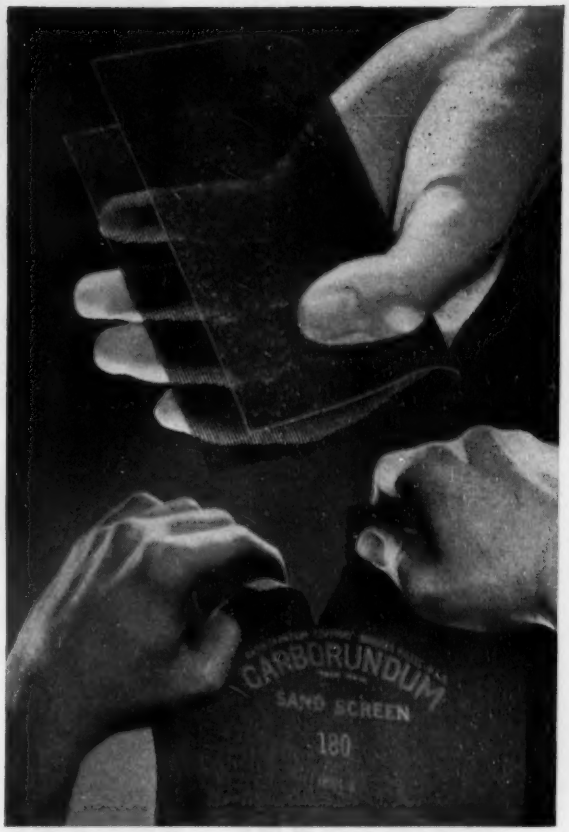
USE IT WET OR DRY... BY HAND OR MACHINE

Use SAND SCREEN the same way you use your present paper or cloth—wet or dry, by hand or machine. For

Continually putting MORE SENSE in your ABRASIVE DOLLAR...



● CUT SHEETS fit your air or electric vibrating sander



● FOLD it like paper...TEAR it like cloth

sides...do from 7 to 15 times the work!

hand sanding, full 9″ x 11″ sheets fold like paper, tear like cloth to any width you desire. Cut sheets fit your oscillating or vibrating sanders. Discs give best results when used wet with CARBORUNDUM's FASTCUT® Pad 85 Assembly. Ordinarily, no adhesive is needed when sanding flats or slight contours... the surface of the FASTCUT Pad holds the disc in place. Full sheets, cut sheets and discs come in 180 and finer grit sizes.

WHERE WOULD YOU LIKE TO USE SAND SCREEN?

We will work with you to help you take full advantage of SAND SCREEN's many advantages and cost-cutting features. Just tell us what operations you would like to test it on. Call your CARBORUNDUM Distributor or Salesman (listed under "Abrasives" or "Grinding Wheels" in the yellow pages). Or, if you prefer, write to us. Send the coupon for a sample and full details, anyway!

Send for Folder... use this Coupon!

THE CARBORUNDUM COMPANY, Dept. AM 82-46
Niagara Falls, New York
Rush folder about new SAND SCREEN.

NAME _____ TITLE _____

COMPANY _____

STREET AND NUMBER _____

CITY _____ ZONE _____ STATE _____

CARBORUNDUM

REGISTERED TRADE MARK

82-46

Collet "A"
Actual Size

Collet "B"
Actual Size

Can you identify these HARDINGE ELMIRA, N.Y. Collets?

Collet "A"

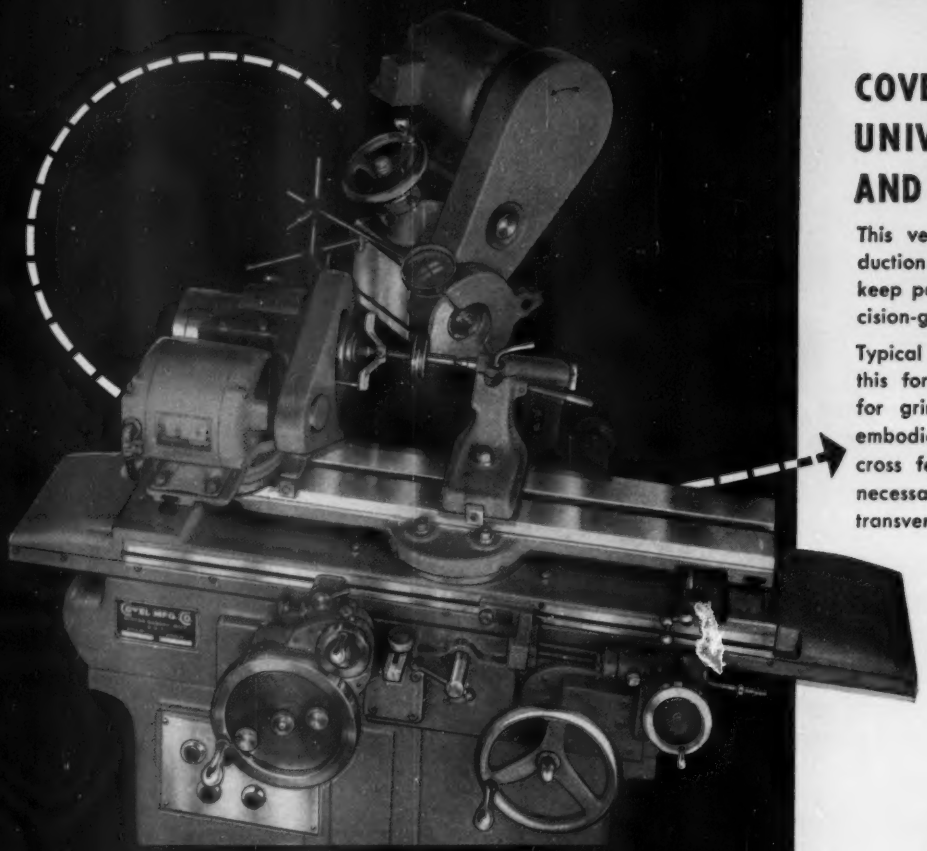
CAPACITY: 1" Round, 7/8" Hexagon, 3/4" Square
USED ON: Hardinge Lathes, Millers, Second Operation Machines, Chucking Machines, Index Fixtures and Sjogren Chucks. Also used with 10" South Bend, 10" Monarch, Sheldon, Rivett and Elgin Lathes; Schauer Polishing Machines; Mead and Zagar Fixtures.

Collet "B"

CAPACITY: 7/8" Round, 3/4" Hexagon, 5/8" Square
USED ON: 12" and 14" American; 14" Cincinnati; 12", 14" and 16" Hendey; 12", 14", 16" and 18" Monarch; 9", 15" and 16" Rockford; 12", 14" and 16" Sebastian; 14" and 16" Springfield Lathes.

Stock Delivery: Both Collets Carried in Stock for Immediate Delivery from Twelve Conveniently Located Warehouses. *Write Hardinge Brothers, Inc., Elmira, New York for Complete Bulletin 50.*

Answer: Collet "A" is a 5C Hardinge. Collet "B" is a 3H Hardinge.



COVEL NO. 12 UNIVERSAL CUTTER AND TOOL GRINDER

This versatile machine can get production off to a flying start — and keep pace with a steady flow of precision-ground, highly efficient tools.

Typical of No. 12's *universal* scope is this form grinding attachment set-up for grinding circular form tools. It embodies fine longitudinal feed—fine cross feed; for the extreme accuracy necessary for both longitudinal and transverse movement.

Write for
12-page detailed
Bulletin A74

PRODUCTION *Starts* IN THE TOOL ROOM

Look to your tool room — where production starts — and see whether your tool-makers and set-up men are hampered by obsolete, inaccurate and wasteful grinding equipment. Poorly ground tools and cutters handicap production every step of the way — through inferior results, costly rejects, loss of valuable time, expensive tool waste.

If your cutter and tool costs *are* high, perhaps you are *paying* for Covel quality without enjoying its many profit-saving advantages . . . and if so, now is the time to call on Covel for the answer. We will be pleased to send complete information.

80 YEARS of continuous manufacturing experience makes your COVEL choice a sound one.

COVEL PRECISION GRINDERS

BENTON HARBOR, MICHIGAN

DRILL GRINDERS • UNIVERSAL CUTTER & TOOL GRINDERS • HYDRAULIC & HAND FEED SURFACE GRINDERS

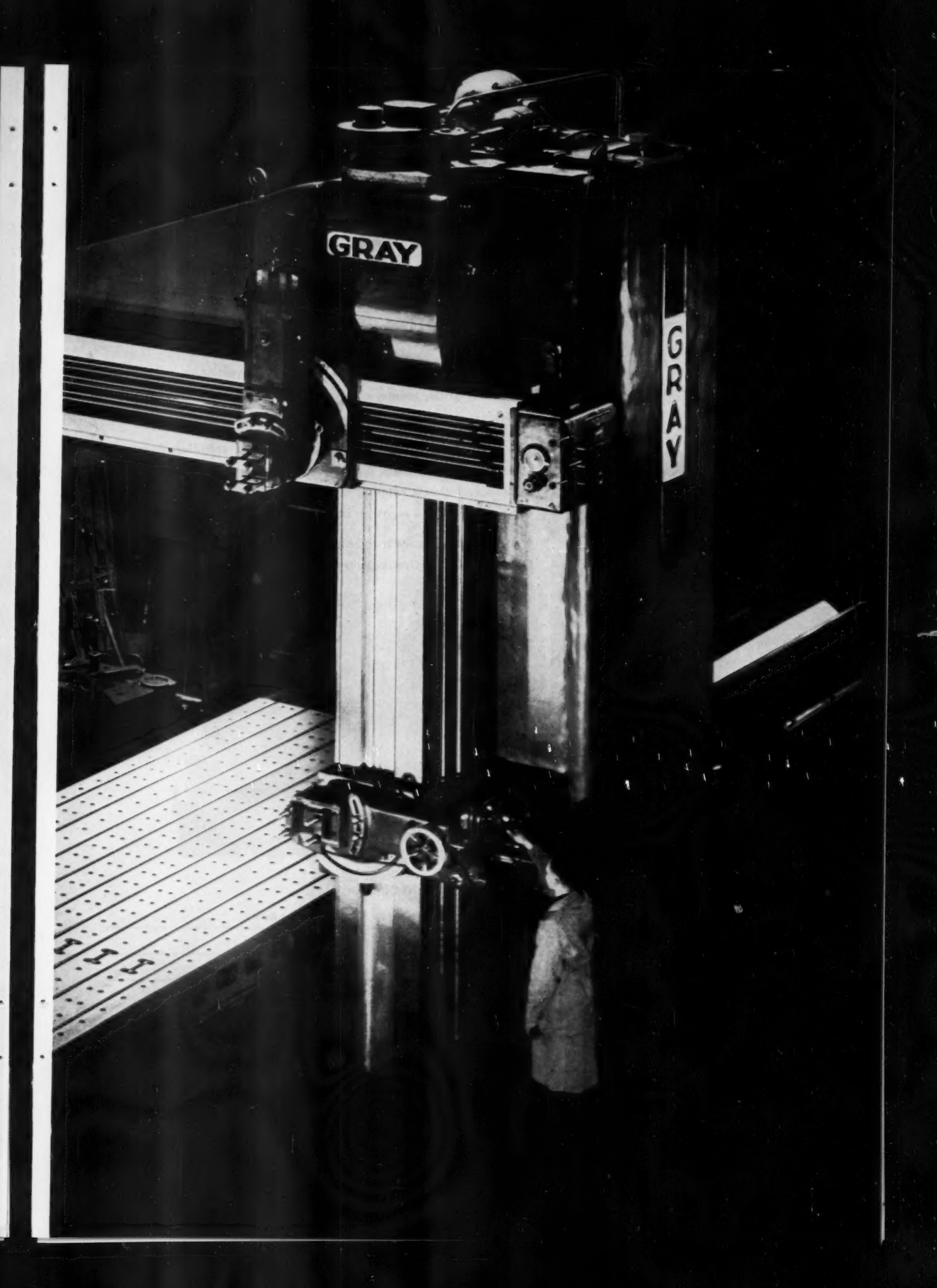
King - size

Here is one of the year's largest planers, a GRAY, immense in size, yet so superbly engineered and magnificently built that its precision performance is a marvel to behold.

All GRAY planers from king-size Giants to eager Cubs are built for high production. They have more original engineering developments and production features than any other planer. They are in such demand that GRAY is the largest planer builder, further proof that

Quality doesn't cost . . . it pays.

The G. A. GRAY Co., Cincinnati, Ohio.


GRAY
GRAY

Another typical

Morris

MOR-SPEED

production machine

performance record

35% SAVINGS IN LABOR

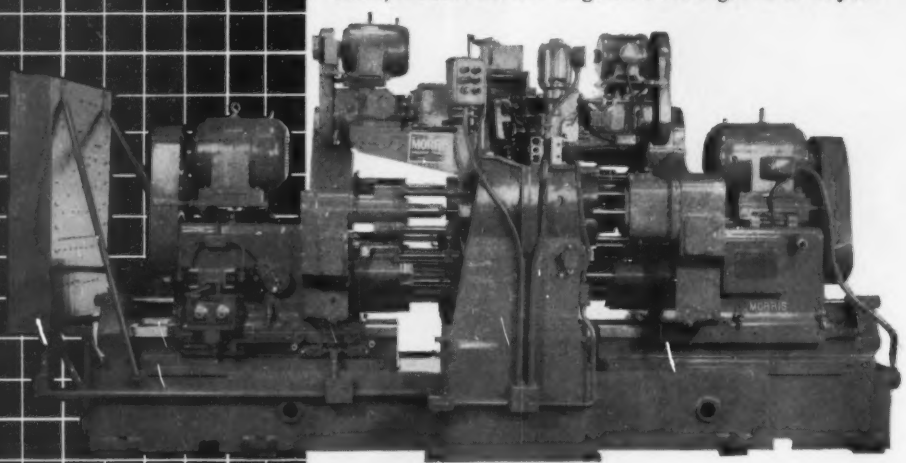
REPLACES 6 OLDER MACHINES

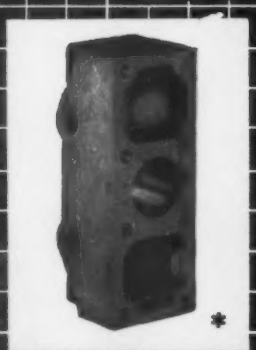
PAYS FOR ITSELF IN 9 MONTHS

The two way horizontal, eight station, automatic indexing machine illustrated drills, reams, countersinks, forms radius and taps 187 refrigeration unit cylinders per hour.

This unit is equipped with nineteen drilling spindles, fourteen countersinking spindles, four counterboring spindles, one reaming spindle and eleven tapping spindles. Twenty spindles are in the left hand head and eighteen in right hand head.

If your work requires numerous operations on a mass production basis, consult us. Our engineers are eager to serve you.





OPERATIONS PERFORMED:

Drill, countersink and tap 8,—¼"—28 tap holes

Drill, ream and chamfer both ends of 1⅛" hole

Counterbore for ⅝" dia. segment

Drill, countersink and tap 1—⅝—12 tap hole

Drill, countersink and tap 2—⅜—24 tap holes

***Refrigeration Unit Cylinder**

Follow the MOR-SPEED Line

Morris **THE MORRIS MACHINE TOOL CO.**

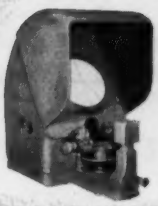
933 Harriet Street, Cincinnati 3, Ohio

"A Better Product at Less Cost with PRECISION PLUS PRODUCTION."

11 MODELS

3 SCREEN SIZES

Pedestal Type
14" Diam. Screen



Bench Type
14" Diam. Screen
4 Models

Bench Type
5¾" x 7¾" Screen
3 Models

Unsurpassed Inspection Versatility

JONES & LAMSON OPTICAL COMPARATORS

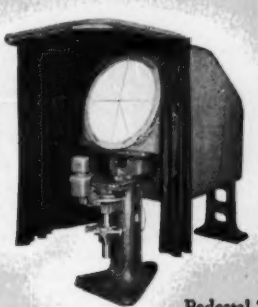
The Essence of Quality Control

Jones & Lamson Optical Comparators are designed and built like rugged machine tools to withstand vibration and hard use. Yet they have the built-in accuracy to satisfy the most exacting laboratory standards.

- **They meet** the requirements of toolroom, laboratory and production inspection.
- **They precisely measure** height, depth, lead or spacing, as well as angles to degrees and minutes. They will measure to .0001".
- **They compare** intricately contoured parts with a master outline—and measure the amount of error.
- **They are convenient** to operate, easy to set up and read direct—*without computation.*
- **They operate** under normal lighting conditions. *No darkroom is needed.*
- **They will photograph** the enlarged shadow and record its relationship to a master chart.
- **Several persons** may study the shadow *at the same time.*
- **They will inspect** and measure surface contours, as well as profiles of objects such as type faces, stamping dies, punches, worn tools, etc.

Vertical Type
14" Diam. Screen

Direct
Projection
Type



Pedestal Type
30" Diam. Screen

Visit the J&L Booth No. 1509 at the ASTE Show.

P.S. A complete line of STANDARD CHARTS and FIXTURES is maintained by us.

JONES & LAMSON

JONES & LAMSON MACHINE COMPANY
502 Clinton St., Springfield, Vt., U.S.A.

Machine Tool Craftsmen Since 1835

COMPARATOR DIV.
Dept. 710

Jones & Lamson Machine Company
502 Clinton Street, Dept. 710
Springfield, Vermont, U. S. A.
Please send Comparator Catalog No. 402.

NAME_____ TITLE_____

COMPANY_____

STREET_____

CITY_____ STATE_____

How to Cut the Cost of Gaging Threads

with TAFT-PEIRCE JOB-RATED GAGES

The *best* gage for most jobs provides the *best* combination of speed, wear-resistance, upkeep, and initial cost. Here are some comparisons that will help you keep costs to a minimum.

Thread Plugs

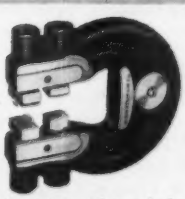
T-P Limit Thread Plug Gage. Standard hardened steel gages are lowest in initial cost and are preferable when soft or moderately hard materials are being inspected in limited quantities. Taper-Lock up to 1.510". Reversible from #0 to ½". Reversible Tri-Lock above 1.510".

T-P Electrolized Gages. With only a modest increase in initial cost, substantially longer wear life can be obtained with this exclusive surface treatment. Many users report up to 3 times longer gage life.

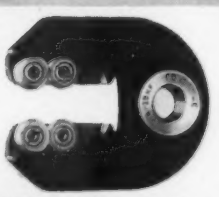
T-P Carbide Thread Plug Gage. For exceptional resistance to abrasion or scratching and maximum wear life. Furnished in both standard and special sizes — from #8 machine screw size up.

Rings & Snaps

T-P Thread Ring Gages. Lower in initial cost than other gages for external threads, they check a combination of all thread errors but cannot distinguish between them.



T-P Adjustable Thread Snaps. Faster than ring gaging, and just as accurate, they check lead, angle, and all other thread elements. Pitch diameter is variable.

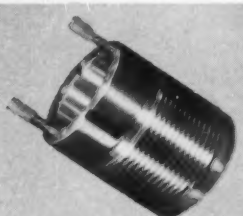


T-P Roll Thread Snaps. Same as adjustable, with *rolls* for gaging members. Since gaging members rotate, wear is spread over greater surface and service life increased.

Special Gages

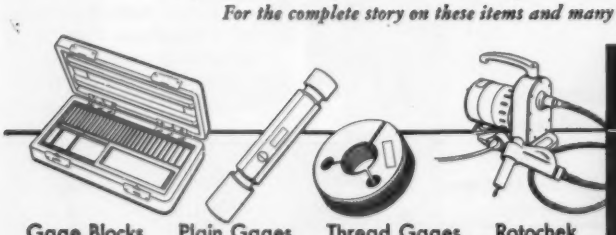
T-P Rotochek (Flexible Shaft Model). Fastest thread gaging method yet devised. Push —and the gage screws into the work. Release the pressure and it stops. Pull—and it disengages. Can be used with most standard T-P plug or ring gages.

T-P Rotochek (Bench Model). Permits bringing work to gage, instead of gage to work. Like flexible shaft model, records indicate it triples rate of parts inspection.



T-P Thread Concentricity Gage. Typical of the infinite variety of special gages made to order by T-P every year. This one checks size and location of internal threads.

For the complete story on these items and many more, send for your copy of the Taft-Peirce Handbook.



Gage Blocks Plain Gages Thread Gages Rotochek

T-P means Top Precision

T P

THE TAFT-PEIRCE MANUFACTURING COMPANY, WOONSOCKET, R. I.

IT'S SOLID . . ADJUSTABLE . . COMPACT!

Whenever you need an adjusting tap, but can't use a collapsing tap . . . especially where tooling space is limited and fast withdrawal not necessary . . . you'll find the GEOMETRIC Class SJ Solid Adjustable Tap ideal. This short, stubby tap will give you the advantages of fast adjustment to required decimal sizes or different class of thread and may be used for more than one pitch by the use of interchangeable chasers!

Class SJ taps available in eleven sizes covering the cutting range $1\frac{5}{16}$" through $8\frac{1}{2}$".

Write for full details. Specify Bulletin SJ

Greenfield Tap and Die Corporation

GEOMETRIC TOOL COMPANY DIVISION

NEW HAVEN 15, CONNECTICUT

Ham on Rye or Rye on Hand?

Count BOTH

(and 1,001 Other Items)

with this New Veeder-Root

VARY-TALLY

Multiple-Unit Reset Counter

Knowing how many apple versus lemon pies, for instance, are ordered on a given day . . . or how many cases of what are in the cellar . . . helps a restaurant *count*rol, make plans, make profits. The same goes for a manufacturer or wholesaler seeking tighter inventory control . . . or for any of the following:

- Traffic Engineers
- Schools and Colleges
- Nurserymen and Florists
- State Park and Forest Services
- Laboratories
- Milk Plants and Ice Cream Processors
- Researchers
- Industrial Plants
- Textile Mills
- Inspection and Quality Control
- Jobbers, Wholesalers, Distributors
- Restaurants and Hotels
- Mail and Phone Order Departments
- Laundries and Linen Supply Houses
- Manufacturers of equipment for:
  - Order Control
  - Stock Control
  - Inventory Control
  - Traffic Control
  - Sales and Market Analysis
  - Laboratory Analysis
  - Payroll Preparation
- and What Do You Want to Count?

Arranged compactly on stands in tiers, the Vary-Tally can be supplied in any of 66 combinations, up to 6 banks high and 12 units wide, with a minimum of 2 units wide. Write for news sheet and prices.

"The Name that Counts"

VEEDER-ROOT INC.

HARTFORD 2, CONNECTICUT

Chicago 6, Ill. • New York 19, N. Y. • Greenville, S. C. • Montreal 2, Canada • Dundee, Scotland • Offices and Agents in Principal Cities

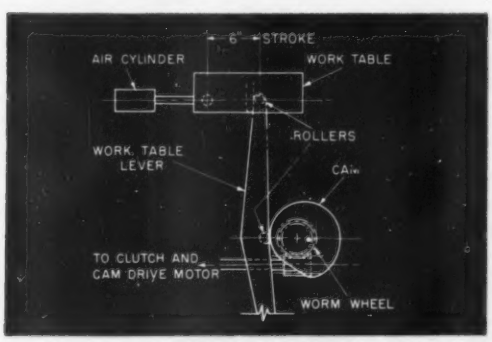
THE BRYANT 6″ STROKE *all Mechanical* BORING MACHINE

gives you

uniform accurate production

in precision boring, drilling, turning, facing, grooving and contour boring and turning

Higher Production Rates — The Bryant 998 is designed specifically to give rapid production with constant repetitive accuracy. The table is actuated by a simple cam and lever unit which provides positive control of the cycle at all times. This mechanical actuation of the table eliminates variation in the cycle due to temperature change. An air cylinder exerting uniform pressure directly on the table keeps the cam follower roll in steady contact with the cam, thus preventing backlash and jump. Cycle may be semi-automatic or automatic.



Finer Finishes — The Bryant 998 provides smooth, uniform table motion, an essential factor in generating a fine finish with a single point tool. The table moves on two 4″ diameter solid steel slide bars firmly bolted to the bed. Each bar has two anti-friction preloaded ball bearings providing a metal-to-metal contact which eliminates slight shifting due to the presence of an oil film. The boring head spindles rotate in special super-precision ball bearings. These are spring-loaded, to ensure maintenance of spindle alignment during both boring and facing operations.

Less Down-Time — The Bryant 998 requires minimum maintenance. Motors, boring heads and slides are permanently grease sealed. This simple mechanical design is easily understood, and the units are accessible for maintenance.

BRYANT Chucking Grinder Co.
SPRINGFIELD, VERMONT, U. S. A.

Internal Grinders • Boring Machines
Internal & External Thread Gages • Granite Surface Plates

Mail coupon for complete details!

BRYANT CHUCKING GRINDER CO.
SPRINGFIELD, VT.

Gentlemen: Please send me your Bulletin 998. AM

Name.....

Title.....

Company.....

Street.....

City.....Zone....State.....

. . . *but*
Experience Cannot be Copied

More than a quarter-century ago MARVEL invented and basically patented the MARVEL High-Speed-Edge Hack Saw Blade—the UNBREAKABLE blade that increased hack sawing efficiency many-fold.

Every MARVEL Hack Saw Blade ever sold has been of that basic welded high-speed-edge construction, with constant improvements from year to year, as EXPERIENCE augmented the "know-how" . . .

MARVEL is not "tied" to any single source of steel supply, and has always used the best high speed steels that became available from time to time as metallurgy progressed. When-as-and-if finer steels are developed—and are proven commercially practical for welded-edge hack saw blades—MARVEL will use them, regardless of cost or source . . .

There is only one genuine MARVEL High-Speed-Edge! All other "composite" or "welded-edge" hack saw blades are merely flattering attempts to imitate — without the "know-how" of MARVEL EXPERIENCE . . .

Insist upon *genuine* MARVEL High-Speed-Edge when buying hack saw blades—and be SAFE, for you can depend upon MARVEL. They have been "tested", "pre-tested", and "re-tested" by thousands of users for more than a quarter-century!

MARVEL *Metal Cutting* SAWS

Better Machines-Better Blades

ARMSTRONG-BLUM MFG. CO. • 5700 Bloomingdale Ave. • Chicago 39, U.S.A.

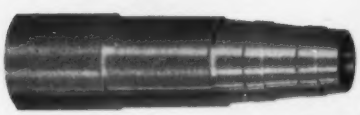
See how times have changed for the Charles L. Jarvis Company!

Middletown, Connecticut

THE REASON:
a double duty
CLEVELAND
DIALMATIC!

Parts shown half size

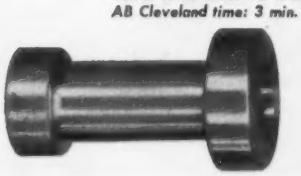
BAR JOBS:



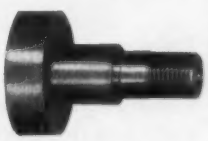
Part: Handpiece Shell
Material: CRS
Turret lathe time: 10 min.
AB Cleveland time: 3 min.

Part: No. 2 Morse Taper Shank
Material: CRS
Turret lathe time: 6 min.
AB Cleveland Time: 2 min.

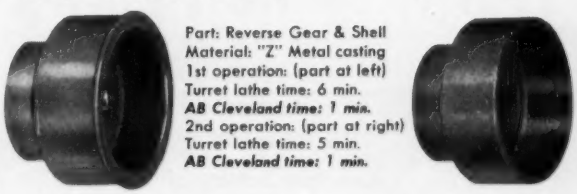
Part: Pinion Gear
Material: SAE 4160
Turret lathe time: 12 min.
AB Cleveland time: 3 min.



Part: Drive Flange
Material: CRS
Turret lathe time: 13 min.
AB Cleveland time: 2 min.



CHUCKING JOBS:



Part: Reverse Gear & Shell
Material: "Z" Metal casting
1st operation: (part at left)
Turret lathe time: 6 min.
AB Cleveland time: 1 min.
2nd operation: (part at right)
Turret lathe time: 5 min.
AB Cleveland time: 1 min.

Many component parts for Jarvis "Multi-Tappers" and other power tools and accessories manufactured by The Charles L. Jarvis Co., Middletown, Conn., are now being produced on the Model AB Cleveland *Dialmatic* shown above.

At the Jarvis plant, this Cleveland Single Spindle Automatic is doing *double duty!* As components are machined both from bar stock and rough castings . . . and as this Cleveland can be quickly converted from a 3" bar machine to a *chucking automatic* having 6" swing . . . a wide range of parts are turned out at *outstanding time savings!*

Typical parts are shown above, listing comparative machining times. *Note the time savings!* Let a Cleveland Sales Engineer show you how a Cleveland Dialmatic can produce similar savings for *your* shop. For machine details and specifications, write for bulletin describing the 3" Model AB. Other sizes and models available.

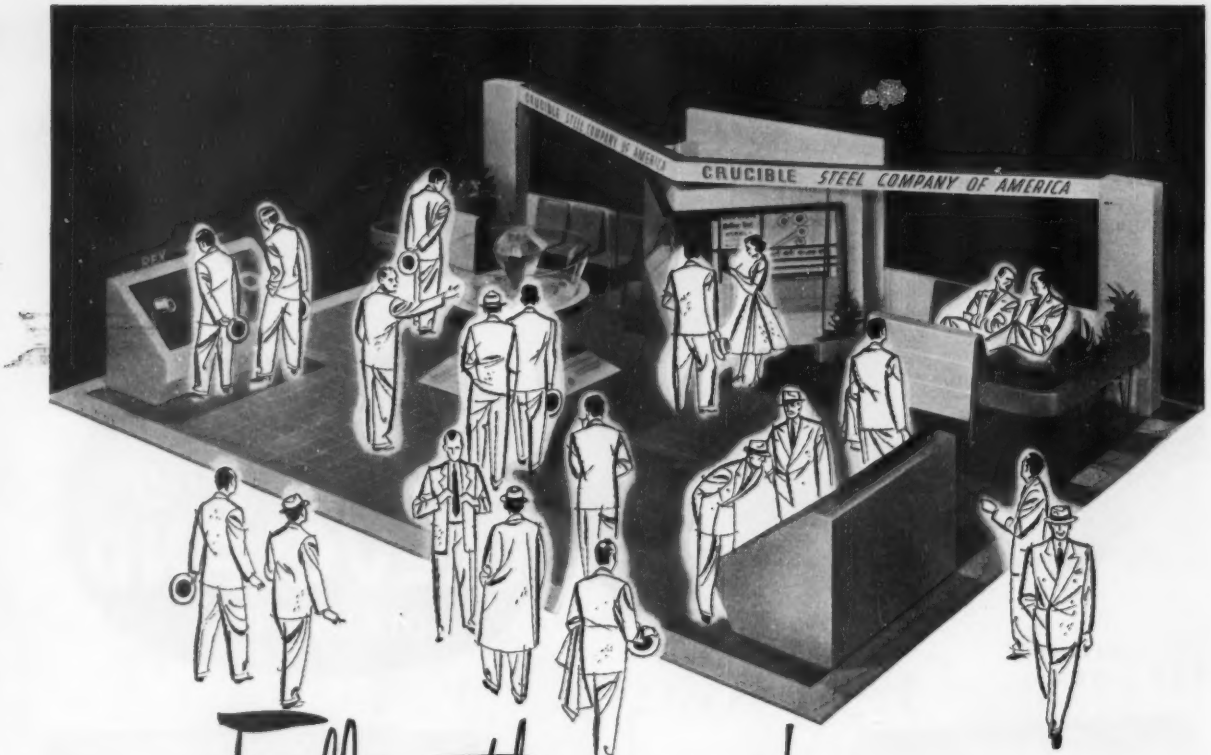
Remember: *Clevelands Cut Costs*

THE CLEVELAND AUTOMATIC MACHINE COMPANY

4928 Beech Street
Cincinnati 12, Ohio

SALES OFFICES: CHICAGO
CLEVELAND • DETROIT
HARTFORD • S. ORANGE

Manufacturers of a Complete Line of Single Spindle Automatic Screw Machines and High Pressure Hydraulic Die Casting Machines



Follow the crowd

TO THE BIG CRUCIBLE EXHIBIT AT THE ASTE SHOW...

BOOTH 626
American Society of Tool Engineers Show
Convention Center, Philadelphia, Pa.
April 26-30

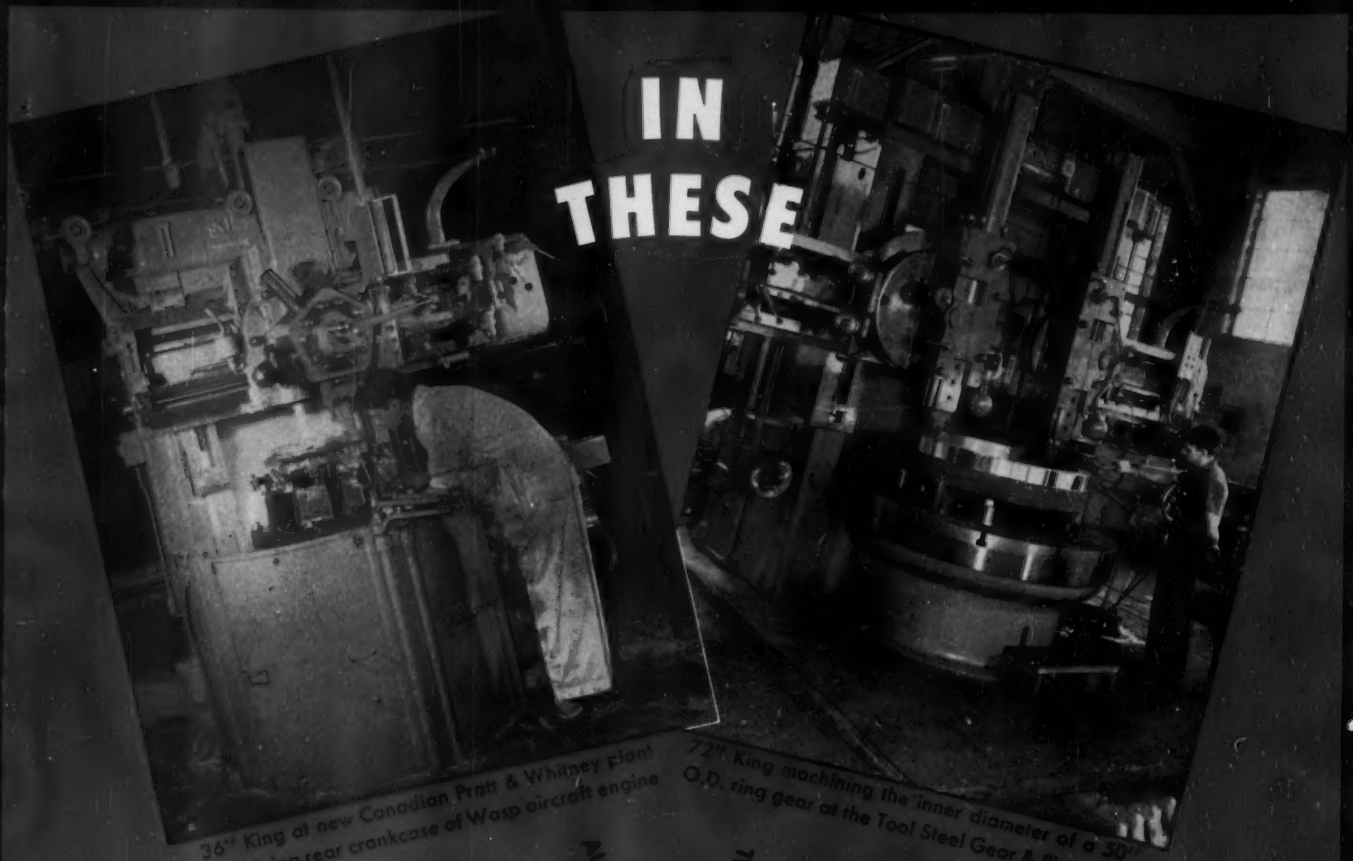
There are always worth-while things to see at the Crucible exhibit... and there'll be even more in the way of helpful material this year. Among other items, you'll find new exhibits and information on Rex high speed steels, tool steels—including hollow tool steel bars—and other special purpose steels.

You'll find, too, a group of experienced Sales Engineers and technical people who can help you with your application problems. So be sure and follow the crowd to the Crucible booth. We'll look for you.

CRUCIBLE first name in special purpose steels

54 years of Fine steelmaking **TOOL STEELS**

CRUCIBLE STEEL COMPANY OF AMERICA • TOOL STEEL SALES • SYRACUSE, N. Y.


IN THESE
36" King at new Canadian Pratt & Whitney Plant machining rear crankcase of Wasp aircraft engine
72" King machining the inner diameter of a 50" O.D. ring gear at the Tool Steel Gear & Pinion Co.

MACHINE TOOLS · VALVES · TIRE MOLD · RAILROAD · AUTOMOTIVE · ELECTRICAL · ORDNANCE · IRON & STEEL · MINING · SHIP BUILDING

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OIL WELL EQUIPMENT · INDUSTRIAL EQUIPMENT · CONSTRUCTION MACHINERY · EARTH-MOVING EQUIPMENT

IT'S KING FOR *Accuracy, Power, Speed, Versatility*

KING Vertical Boring and Turning Machines are designed in every detail to give you performance that sets new standards in production cost-cutting. Incorporating traditional KING qualities of massive proportions, heavy weight, extreme rigidity and accuracy, these versatile machine tools can take on heaviest cuts at highest speeds within the capacity of modern cutting tools.

Production time is further speeded up by the labor-saving ease of operation made possible by KING centralized controls. All controls are conveniently located at front of the machine. On-the-spot precision adjustments are made quickly from the operator's normal working position.

Throughout industry, KING Vertical Boring and Turning Machines have proved their ability to cut costs and improve quality on the complete range of boring, facing, and turning work. Made in 10 sizes, from 30" to 144"—the widest range in the field. Investigate KING advantages now!

American Steel Foundries
KING MACHINE TOOL DIVISION

KING
VERTICAL BORING & TURNING MACHINES

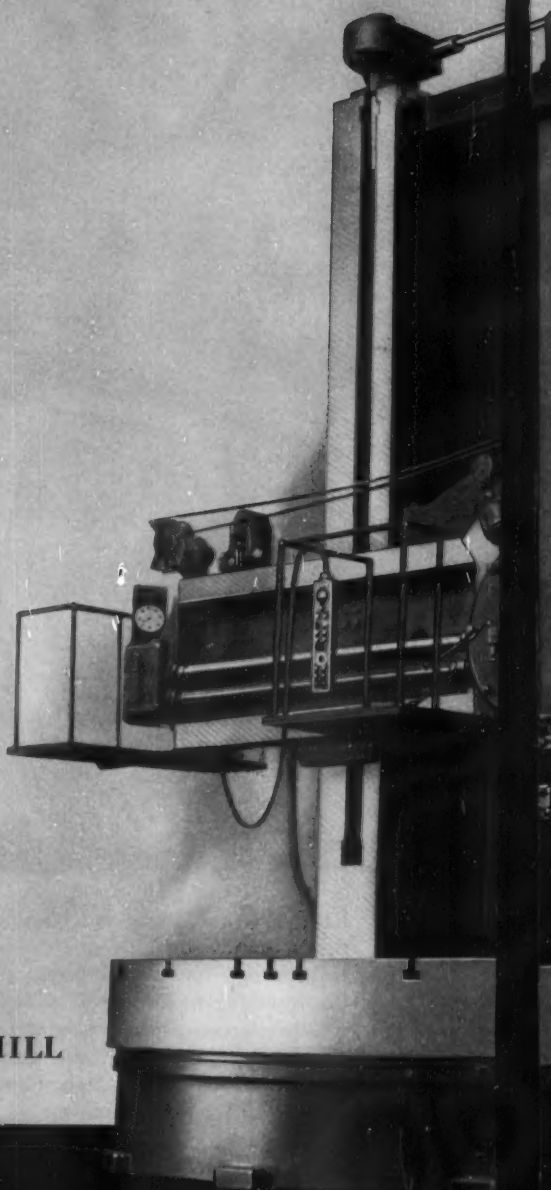
1350 Tennessee Avenue
Cincinnati 29, Ohio

...another BIG one!

Yes, it's a big one, but Consolidated builds them larger and also smaller.

But more than bigness is the quality of the engineering thinking that goes into Consolidated Machine Tools. For example, on this 20 Foot BETTS Vertical Boring Mill, there isn't a single gear shift lever on the entire machine! Gear changing and all other operating functions are performed 100% from the pendant switches at the cutting tools.

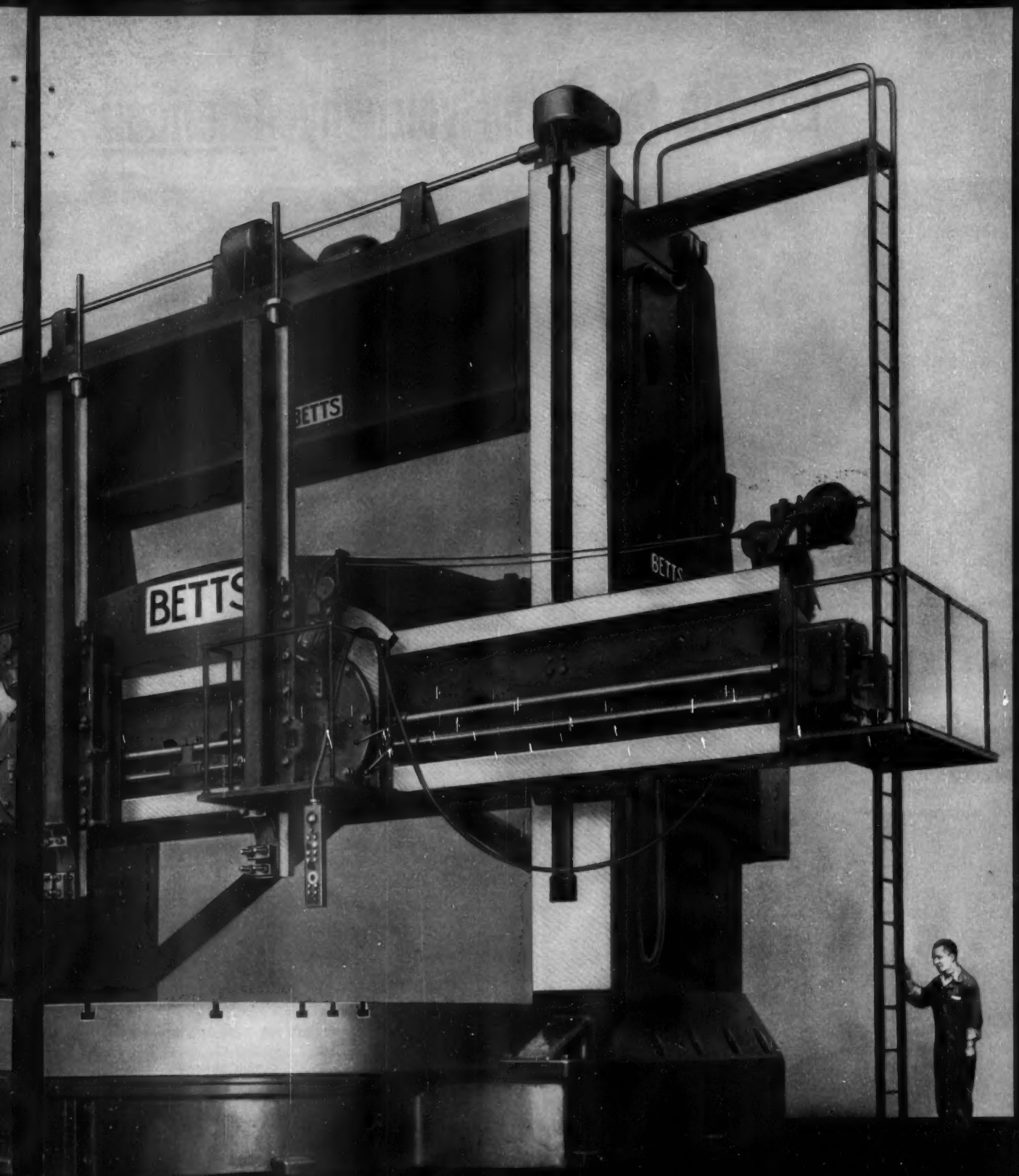
In Consolidated Machine Tools you get tomorrow's engineering today!



BETTS 20-FOOT
VERTICAL BORING MILL

CONSOLIDATED MACHINE TOOL

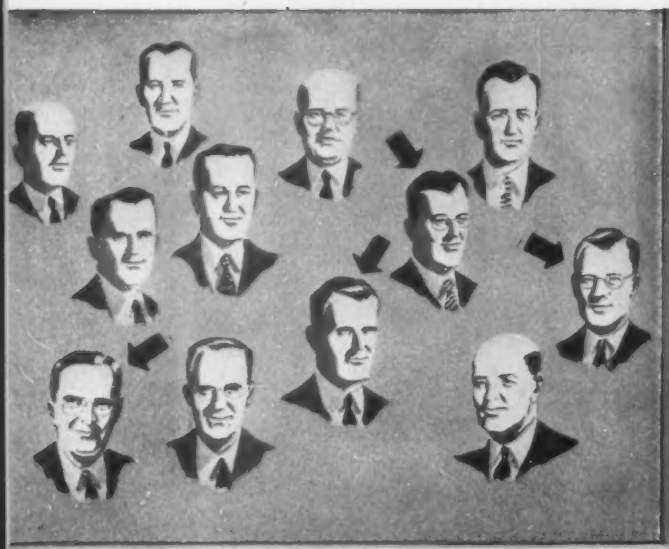
Wholly owned subsidiary of Farrel-



CORPORATION, ROCHESTER, N. Y.

Birmingham Company, Incorporated

Let the facts tell you why American



Metalworking's Only All-paid Circulation

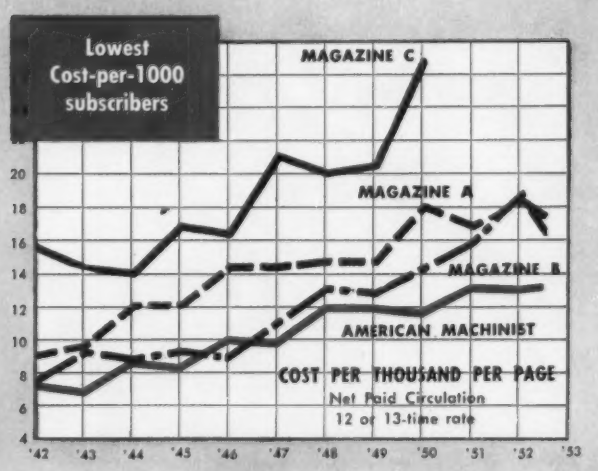
ABC net-paid circulation, June 1953: 32,649
Net-paid, December 1953: 33,000

(Subject to ABC audit)

Because the first requisite advertisers have always demanded of a business magazine is a *selective* audience . . . composed as completely as possible of men with buying power for their particular products . . . it is important for every advertiser whose products are used by *metalworking production* to know *how much more American Machinist offers them* in this respect than any other metalworking magazine published.

Because *American Machinist* is edited *exclusively* for metalworking production men, and is the only all-paid circulation magazine among leading metalworking publications, the proved interest of its subscribers in *metalworking production* is self-evident. And today *American Machinist* has more production-responsible subscribers than any metalworking magazine has ever offered before . . . 33,000 of them.*

*December, 1953 (subject to ABC audit)



Thus . . . because *American Machinist* is Metalworking's outstanding example of what a top-flight industrial magazine *should* be: selective, purposeful, waste-free, and metalworking-wide in its acceptance and influence . . . 953 advertisers again in 1953 made it the No. 1 advertising medium for the products used and bought by metalworking production.

What's more, all the outstanding and exclusive values which make *American Machinist* so clearly the leading editorial and advertising force in the great 15-division Metalworking Industry are yours at a cost-per-thousand subscribers well below that of any other magazine edited for the biggest of industrial markets.

Machinist is No. 1 in Metalworking

Concentrated Circulation
Where Metalworking Is Concentrated

Concentrated Circulation
Where the Buying Power Is Concentrated

What's more, these *American Machinist* subscribers are concentrated where metalworking production's buying power is concentrated. Eighty per cent of our U.S. subscribers are in the 12 key states in which 81% of Metalworking's important plants (50 or more workers) are located . . .

. . . and 82.88% of *American Machinist* subscriptions are bought and paid for by companies; corporate officials and general managers; department managers, superintendents, and engineers. No other magazine offers you such a concentrated and waste-free paid circulation among the men who are buying the machinery, equipment, components, and services needed to produce $95-billion of metalworking products this year.

SO . . . when *you* want increased sales in the $95-billion Metalworking Industry, and want to build preference for your products among this industry's most important buying group . . . production management . . . the facts will tell you why:

This is the No. 1 place to do business with America's biggest industry

ABP

ABC

THE McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION
McGRAW-HILL BUILDING, NEW YORK 36
PUBLISHED EVERY OTHER MONDAY
MEMBER OF THE AUDIT BUREAU OF CIRCULATIONS AND
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ARMSTRONG

Quality TOOLS

NOT A COST, BUT AN INVESTMENT

That Pays Year After Year . . .

Buy ARMSTRONG TOOL HOLDERS and TOOLS for today's jobs and they will bring you added profits thru the years. With ARMSTRONG TOOL HOLDERS you will be permanently tooled up for whatever comes, for each is a multi-purpose tool that takes cutter bits ground to many shapes. Each is an efficient tool, refined thru a half century of world wide use. Each has strength beyond any need, extra strength resulting from endless research and the most modern closely controlled manufacturing methods.

ARMSTRONG TOOL HOLDERS are inexpensive too, for they are produced in great numbers. They are instantly available because they are carried in stock by all leading supply houses in sizes and types for every operation on lathes, planers, slotters and shapers; for standard operations on turret lathes and screw machines. They are profitable in use because they permit the highest speeds and heaviest feeds and "Save: All Forging, 70% Grinding and 90% High Speed Steel."

ARMSTRONG Lathe and Milling Machine Dogs are permanent tools too. They are drop-forged from special open hearth steel, are heat treated to extreme stiffness and toughness. They have alloy steel screws hardened at the tip to prevent up-setting and have double life, for hubs are made oversize to permit re-tapping.

ARMSTRONG Quality pays back over and over again. *Write for new S-48 catalog.* It offers many opportunities to conserve profits.

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

5215 W. ARMSTRONG AVENUE • CHICAGO 30, ILL.

MEET THE CINCINNATI 19" Hydroform

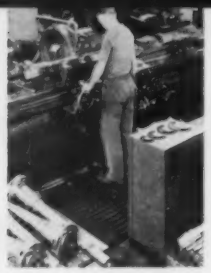
Here is the newest member of the Cincinnati Hydroform family . . . a 19″ machine which provides manufacturers with facilities for producing parts from blanks up to 19″ in diameter, having a maximum drawn depth of 8″. Material thickness of the formed part can range up to ¾″ cold rolled steel. A maximum forming cavity pressure of 15,000 psi provides the same high degree of formability that is available in the 12″ and 26″ Hydroform machines. Many intricate shapes can be formed in one operation, as the percentage of reduction in the draw is far greater than is obtainable by conventional practice.

The hydraulic power unit for the 19″ Hydroform is pit mounted to provide unobstructed floor space surrounding the machine. With this arrangement, the machine occupies an area only six feet square at floor level. Machine height above floor level is 11⅔ feet.

Since the introduction of Hydroforming, this revolutionary deep drawing process has been widely accepted. Now, Hydroform machines are being employed on an extremely broad range of development work and on short run and quantity production.

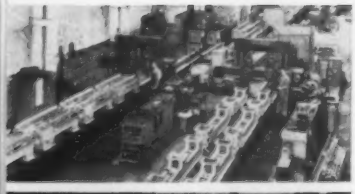
Is your company fully informed of the many Hydroforming advantages? Let a Cincinnati Milling field engineer give you complete details. For general Hydroform data and specifications of the 8″, 12″, 19″, 23″, 26″ and 32″ Hydroform machines, write for your copy of Bulletin M-1759-3.

CINCINNATI Hydroform **THE CINCINNATI MILLING MACHINE CO.**
CINCINNATI 9, OHIO, U.S.A.

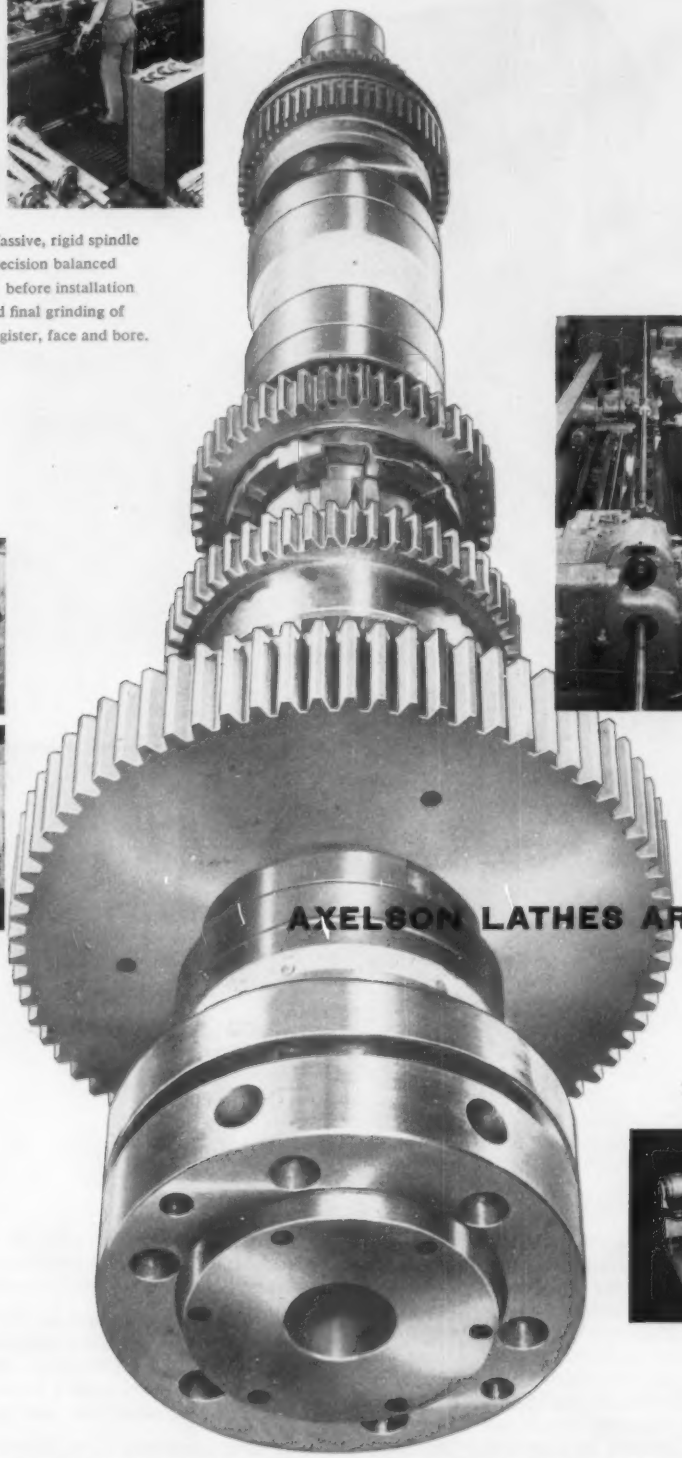


Massive, rigid spindle is precision balanced before installation and final grinding of register, face and bore.

Thread milling stress relieved alloy steel lead screw in a temperature-humidity controlled room.

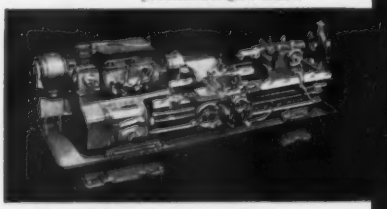


Planing of the bedway and final precision grinding of tool steel vee and flat ways are vital operations in the final accuracy of the finished lathe.



AXELSON LATHES ARE ACCURATE

20" Model D heavy duty, 24 speed precision engine lathe.



Axelson lathe quality control, which starts in Axelson's *own* foundry, follows a rigid pattern throughout each step in production and assembly. Never is it more apparent than during the machining stage. Here, skilled Axelson craftsmen use the most modern machine tools to provide that extra measure of accuracy and dependability so well known to users of Axelson lathes . . . Get the facts about one of Industry's finest precision tools. Write on your letterhead for NEW, 36 page brochure No. 5400.

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DRILL 1/2 - 4 HOLES 90° APART
Fx ALL 'O' RING GROOVE SURFACES
Fx SQ WITH THD
06 R
1-14 NF THD
3/16 DRILL 6 HOLES 60° X 5° APART
06 R
06 X 45° CHAMFER
Fx SQ WITH THD
06 X 45° CH
100 DRILL
Fx SEAT
STAMP PART No 611 4416
MILL 6 FLATS 60° APART .03 DEEP (FLATS REQUIRED)
52.14219 . 1 MAXEL 3 1/2 - 3.00 O.D. X 10 3/4 LONG
PART NO
DESCRIPTION STOCK
VALVE TESTER
611 4416

intricately machined MAX-EL alloy steel part shows minimum distortion after heat treatment...

Halliburton Oil Well Cementing Company, Duncan, Oklahoma, selected hot rolled MAX-EL 3½ bar stock for the valve shown. It's an important part of their 5⅞" tester, used to sample fluids or gases during drilling operations, sometimes 15,000 to 20,000 feet below the surface.

The valve is machined in the annealed condition and then heat-treated. Even though it varies considerably in thickness, no distortion problems are encountered in this MAX-EL part.

Try MAX-EL in your shop. You'll like its better machinability, freedom from distortion and over-all quality. And you'll get longer tool life . . . more pieces per grind. Call Crucible for immediate warehouse delivery of MAX-EL steels.

CRUCIBLE first name in special purpose steels

54 years of Fine steelmaking **ALLOY STEELS**

CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

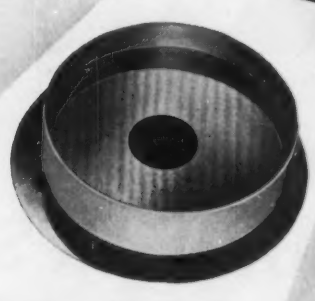
Branch Offices and Warehouses: ATLANTA • BALTIMORE • BOSTON • BUFFALO • CHARLOTTE • CHICAGO • CINCINNATI • CLEVELAND • DAYTON DENVER • DETROIT • HOUSTON • INDIANAPOLIS • LOS ANGELES • MILWAUKEE • NEWARK • NEW HAVEN • NEW YORK • PHILADELPHIA • PITTSBURGH PROVIDENCE • ROCKFORD • SAN FRANCISCO • SEATTLE • SPRINGFIELD, MASS. • ST. LOUIS • ST. PAUL • SYRACUSE • TORONTO, ONT. • WASHINGTON, D. C.

Tiny?

Yes! The No. 11 Blanchard Surface Grinder grinds these ladies' watch gears, pinions and ruby bearings flat and parallel, and to a dimension tolerance of .0002".

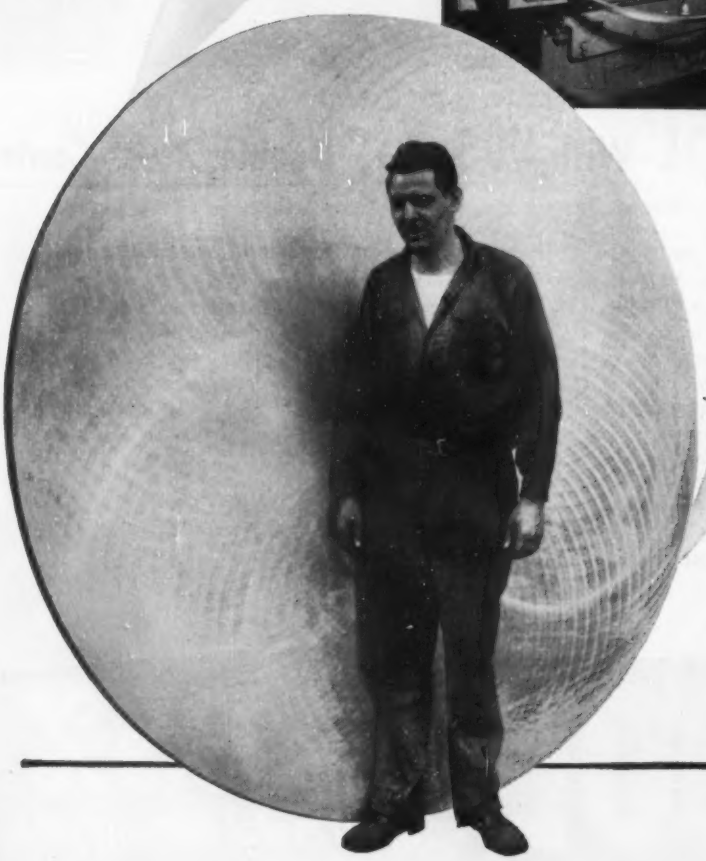
Smooth?

Of course! The Blanchard No. 11 finished this refrigerator plate, seen through an optical flat, to 3 micro inches and flat within 1 light band (.0000118").



Accurate?

Sure . . . and easy, too! This Blanchard grinds 84" forged steel rings flat within .0002", parallel to .0002", dimension tolerance of ±.0005", and with surface finish of 4 micro inches.



Tremendous?

Yes . . . but fast! This 88" diameter cast-iron plate was ground on a No. 42-72-84 Blanchard in 3½ hrs., floor to floor. ¼" of stock—1520 cu. in.—380 lbs. was removed.

If you produce flat surfaces, your best bet is Blanchard Grinders—with Blanchard Wheels!

PUT IT ON THE BLANCHARD

Send for your free copies of "Work Done on the Blanchard", fourth edition, and "Art of Blanchard Surface Grinding".

THE BLANCHARD MACHINE CO.
64 STATE ST., CAMBRIDGE 39, MASS., U. S. A.

REYNOLDS ALUMINUM CAST PLATE AND BAR

A Revolutionary Material for Low Cost Tools, Dies and Fixtures

Reynolds cast aluminum plate and bar of high dimensional stability offers better performance, and longer production life than other low cost tool and die materials. First proved superior in the aircraft industry, cast aluminum plate and bar has solved tool and die problems on experimental and short to medium production runs in many other industries.

Included among the outstanding features of Reynolds cast aluminum plate and bar are low cost, precision surfaces, fine grain structure, fast and free machining, excellent thermal characteristics, lightweight and a wide range of standard sizes.

For full details on Reynolds Aluminum Cast Plate and Bar, call your nearby Reynolds office listed under "Aluminum" in the classified telephone directory, or write Reynolds Metals Company, 2523 South Third Street, Louisville 1, Kentucky.

Write for free brochure, "Reynolds Aluminum Cast Plate and Bar for Machine Shops, Foundries and Pattern Shops."

See "Mister Peepers" Sundays, NBC-TV. Consult local listings for time and station.

REYNOLDS ALUMINUM

MODERN DESIGN HAS ALUMINUM IN MIND

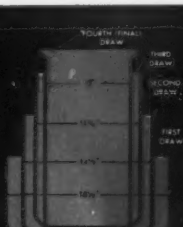
"ALUMINUM FORMING"

Technical Handbook

Write Today! Free when requested on business letterhead.

Everyone who works with aluminum should have this new 148 page handbook, the latest addition to the Reynolds Technical Library. "Aluminum Forming" was published so that design engineers and plant supervisors could have, in a single volume, complete information on the proper techniques for working aluminum. Design and fabricating practices with aluminum are not always like those for other metals. So, in some cases modifications or even special procedures may be required. This handbook fully explains all these procedures and includes more than two hundred and thirty drawings and photographs, twenty-two tables and thirty-two formulas.

These are typical of the many illustrations in Aluminum Forming. Left, drawn shell of 3S-O aluminum. Right, various stages of drawing necessary to produce shell. (Book includes formula for estimating number of draws.)



See "Mister Peepers" Sundays, NBC-TV. Consult local listings for time and station.

For your free copy of the valuable Forming handbook plus a complete index of Reynolds technical literature, write on business letterhead (otherwise price of book is $1.00). Reynolds Metals Company, 2523 South Third Street, Louisville 1, Kentucky.

REYNOLDS ALUMINUM

MODERN DESIGN HAS ALUMINUM IN MIND

Certified **BRAD FOOTE GEARS**

A NEW WAY FOR YOU TO BUY GEARS

• Now you can specify by brand name the gears or assemblies you need and be sure that every desirable quality for longer life and lower service cost will be built into them. This name—*Certified* BRAD FOOTE Gears.

Certified BRAD FOOTE Gears are made according to an exclusive BRAD FOOTE formula which controls every step in the manufacturing process. It is your assurance that the gears will have long-wearing teeth and bearing areas, and tough cores that will give service equal to or better than any other gears made.

Copper Plating* permits smooth, quick run-in. It is clean and prevents rust and corrosion before gears are put in service. It's your positive identification of the best gears that money can buy. *Yet . . . you pay no more.*

The Certificate furnished with *Certified* BRAD FOOTE Gears and assemblies certifies strict adherence to specifications and the exclusive BRAD FOOTE formula. It proves that *"no one shares our responsibility."*

**Gears over 30" diameter are protected by copper-colored water-soluble paint which need not be removed before placing in service*

Write today for descriptive literature

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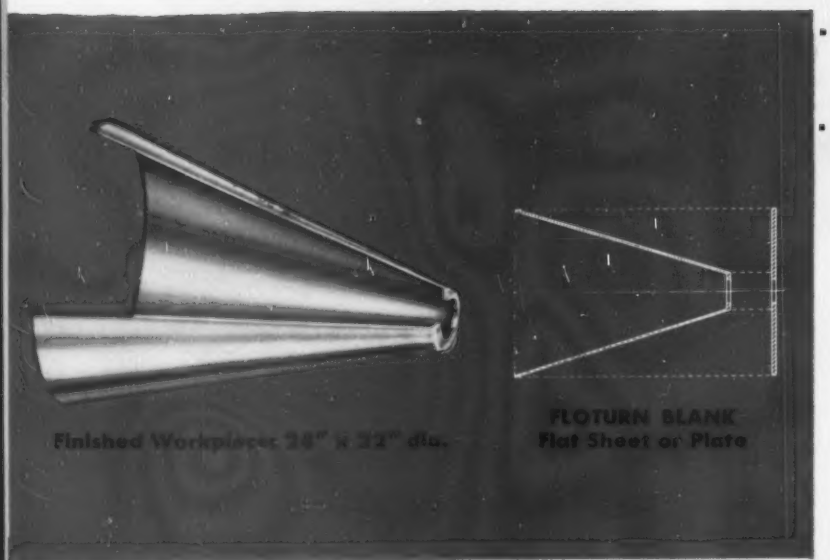
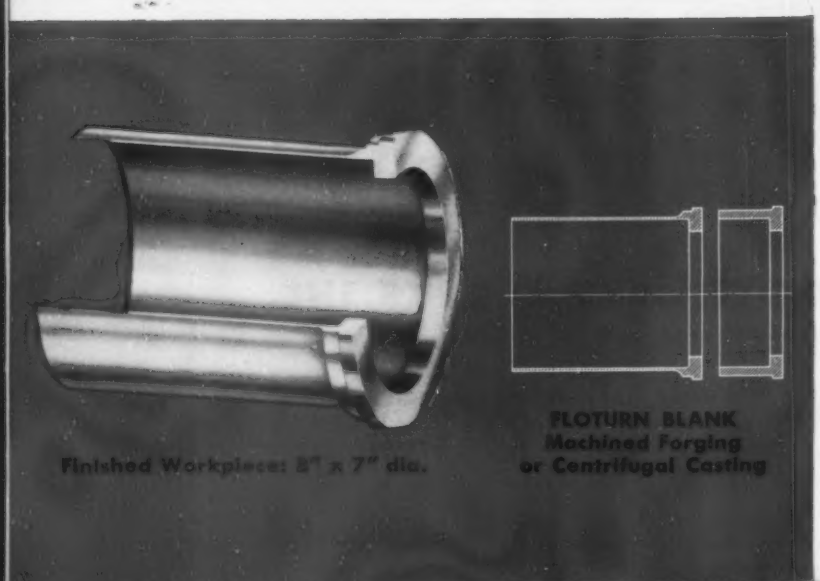
PITTSBURGH GEAR COMPANY — Phone: SPaulding 1-4600 — Pittsburgh 25, Pennsylvania

Lodge & Shipley Announces

FLOTU





...AXIALLY ROLLS SIMPLE BLANKS INTO COMPLEX FORMS.

...DISPLACES METAL BY COLD FLOWING.

FLOTURN is a completely new process originated by Lodge & Shipley. FLOTURN offers startling advantages and economies in precision metal forming at production rates with low-cost tooling. If you are now producing conical or cylindrical parts by conventional drawing, welding, or machining methods FLOTURN may offer you amazing savings in time, materials and tooling! FLOTURN equipment or subcontract service is available only through Lodge & Shipley and its distributors.

HOW FLOTURN WORKS

. . . the FLOTURN process starts with either a simple flat blank, machined blank, machined forging, drawn cup, wrapped and welded cylinder or centrifugal casting.

. . . FLOTURN equipment scientifically applies great pressure against the blank, causes the metal to flow in a cold state. Pressure is spirally applied continuously, flowing the metal to the shape of a mandrel.

FLOTURN IS HIGHLY ACCURATE

. . . wall sections of work are uniform, predetermined, with never changing thickness and can be easily held to $\pm$.002".

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METALWORKING'S NEWEST PRECISION PROCESS

FLOTURN*

an Exclusive and Revolutionary Development in Metal Forming

...ELIMINATES MANY MACHINING, WELDING, DEEP DRAWING OPERATIONS.

...SAVES COSTLY MATERIALS...TIME AND TOOLING OF CONVENTIONAL METHODS.

...PRODUCES FORMS FROM EVEN NEWEST ALLOYS DIFFICULT TO MACHINE.

...ADDS STRENGTH AND HARDNESS TO FINISHED WORK.

FLOTURN SAVES TIME, MATERIALS, TOOLING

... The FLOTURN blank weighs the same or slightly more than the finished part.

Here is how FLOTURN saves on material alone. To produce identical parts, the old forging-machining method required a 369-lb. blank; the FLOTURN method required only a 65-lb. flat blank. Finished weight of both was 50-lb. FLOTURN savings on material alone 82½%!

... FLOTURN tooling is low in cost—only about 1/10 the cost of deep draw dies, for example. Tooling life is long.

FLOTURN FOR A WIDE RANGE OF METALS

... these materials have been formed successfully with FLOTURN:

- ... Steel ... sheet, plate, bar stock or forgings
- ... All 300 and 400 series of stainless steel
- ... Timken 16-25-6 and 17-22S
- ... Haynes Multimet
- ... Universal Cyclops Uniloy 19-9
- ... Inconel and Inconel-X
- ... Monel and K-Monel
- ... Titanium T1-140-A

FLOTURN ADDS STRENGTH AND HARDNESS

... in direct contrast to drawing, FLOTURN increases part strength. For example, in working 302 stainless: *tensile strength increased as much as 100%. After stress relief, 40% of increase was retained. Hardness increased from cold roll annealed to* 57-59R_{30N}

DIFFICULT SHAPES ... FAST ... BY FLOTURN

... Conical, cylindrical, combination of the two and other complex shapes are easily formed by FLOTURN. Tooling for any shape is low cost compared to conventional means.

... FLOTURN plus machining produces parts considered impractical before. Existing jobs are done faster, easier, at lower cost. Finished parts are stronger.

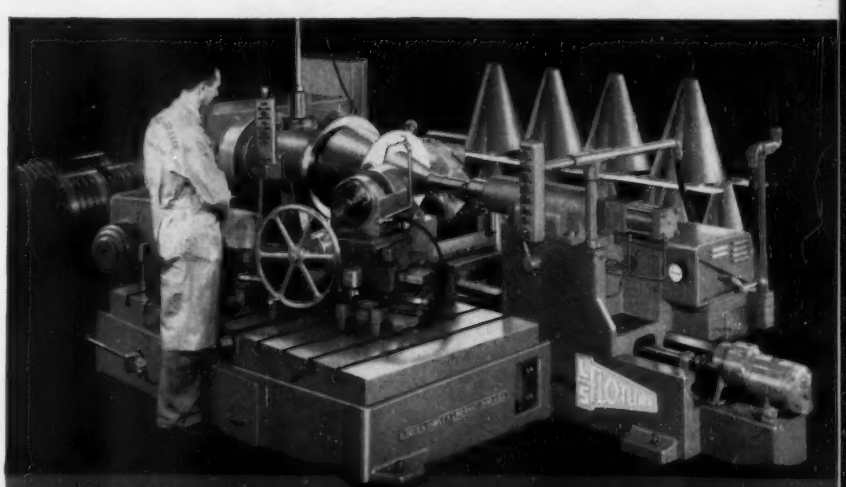
FLOTURN EQUIPMENT OR SUBCONTRACT SERVICE

Standard FLOTURN Lathes handle blanks 5/16" in thickness, 42" in diameter and 24" long on the No. 40 x 24" FLOTURN Lathe. Similar work up to 50" long can be handled on the No. 40 x 50" machine. Larger work may be handled on special FLOTURN equipment.

Lodge & Shipley sells FLOTURN equipment or will produce your parts on contract.

COMPLETE FLOTURN DETAILS ON REQUEST

... the FLOTURN process has been described in detail in leading publications. Send for reprints and complete literature on this exclusive Lodge & Shipley equipment and process.

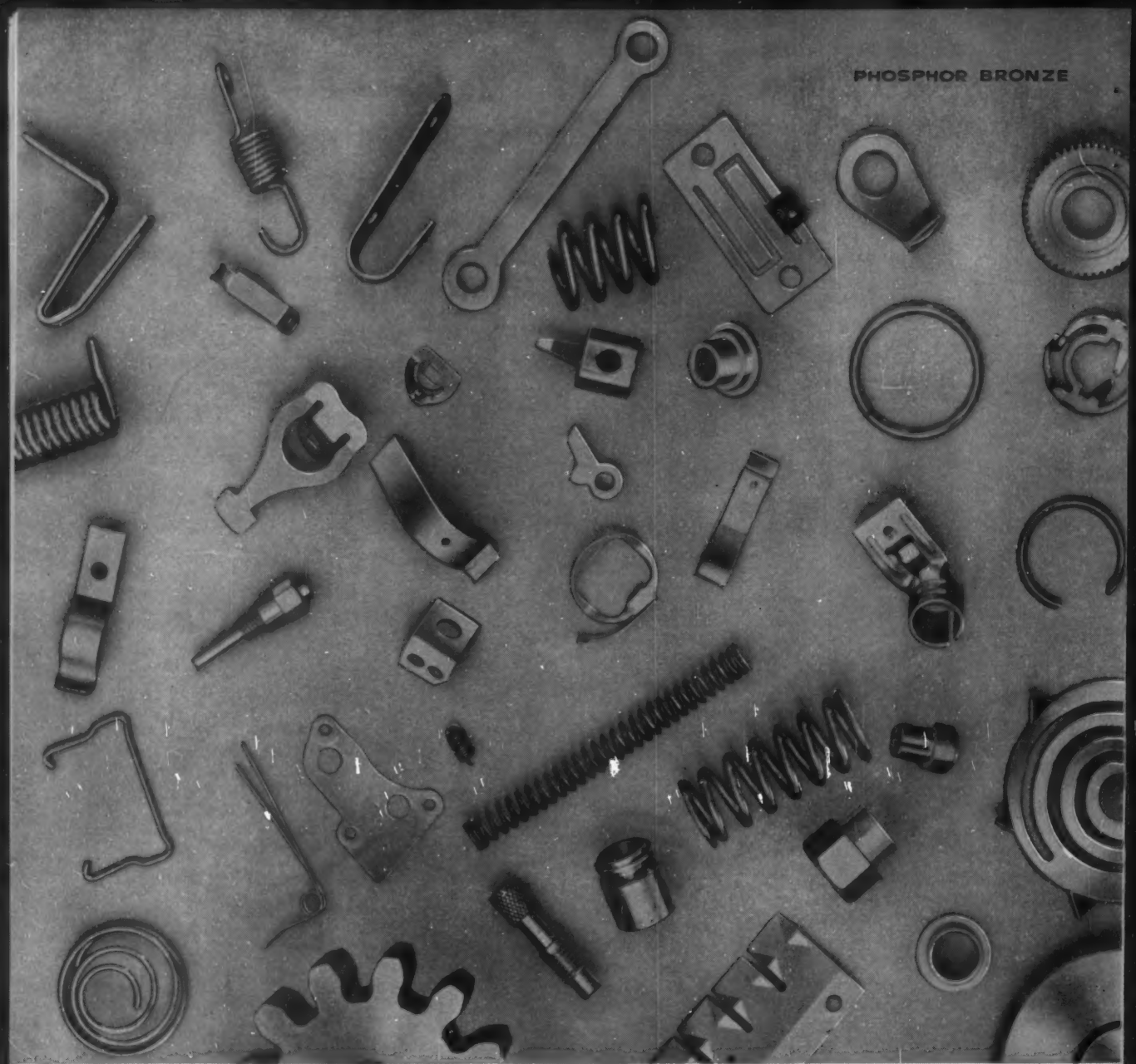


L&S FLOTURN

THE LODGE & SHIPLEY COMPANY

3055 COLERAIN AVENUE, CINCINNATI 25, OHIO

*T/M THE LODGE & SHIPLEY CO. 1954



Parts made of tough ANACONDA Phosphor Bronze wear better, last longer

Ten alloys are available in sheets, plates, strips, wire, rods, bars and seamless tubes.

Constant wear and flexings. Periodic stresses. Fatigue and corrosion. These are the things that can knock machine parts out of commission. But they can't hurt those shown above.

Here's why. All of them are made of ANACONDA Phosphor Bronze Alloys. And these copper-tin alloys are strong and tough. They are non-magnetic. They conduct heat and electricity well. And you can work them easily.

In bushings, gears and bearings Phosphor Bronze doggedly resists abrasion. In switches, springs, diaphragms and electrical contacts it keeps its high elasticity under conditions where less rugged alloys fail.

ANACONDA Prosphor Bronze comes in 10 standard compositions (including a free-cutting alloy). Tin content ranges from 1.25% to 10.0%.

Quality? Our record speaks for itself—a recent study of sheet metal covering two years' production shows that claimed unsuitable quality was at the amazingly low ratio of 400 pounds per million pounds shipped.

Tell us what you make and how it's used. We'll help you select the correct Phosphor Bronze Alloy. *The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.* 5484

ANACONDA®
PHOSPHOR BRONZE

Sheets • Plates • Strips • Wire • Rods
Bars • Seamless Tubes • Special Shapes

Strategy ... FOR QUALITY

BULLARD

Top Quality in your product demands that interchangeable parts be fabricated to the highest degree of accuracy. To obtain such necessary tolerances requires the selection of machines recognized as meeting such high standards. The Bullard Spacer, without the high cost of jigs or fixtures, gives the San Diego Division of Convair, on drilling and counterboring, tolerances up to +.0015 and —.0000, and distance between hole centers within ±.005. On other installations also, with precision drill spindles, The Bullard Spacer holds consistantly to ±.004 and sometimes closer.

Let a Bullard Representative analyze what this machine can do on your work or write to

THE BULLARD COMPANY · BRIDGEPORT 2, CONN. Telephone 6-2511

How Do You Buy Socket Screws?

Many buyers continue to specify some one make by *habit*. They have no particular preference for it, but they think of *all* such fasteners simply as "screws with hex sockets" — *all* makes substantially *alike*.

If you buy that way, and have never tried P-K Socket Screws, just break the habit once, and give them an actual assembly test. You'll get a pleasant surprise.

You'll find that the hex shape of the socket is about the *only* way that other makes and P-K are "alike".

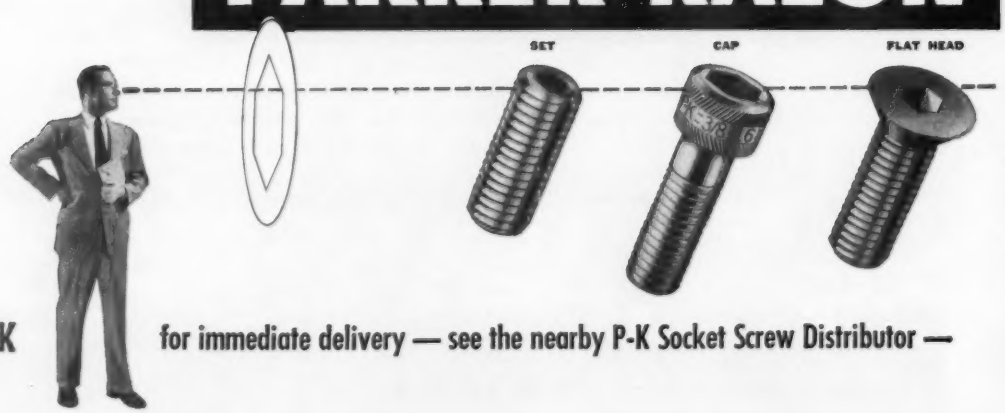
Look Beyond the Hex

It pays to *look beyond the socket* when you buy Socket Screws. Compare every detail of product and service. You'll find P-K Socket Screws take top rating in every test. You get exclusive features that simplify and speed up assembly. You get quality matched to a firm guarantee. You get planning and buying information exactly patterned to your needs.

You need *all* these essentials for cost-wise assembly. Why miss out on *any* of them? Just try P-K Socket Screws. Get samples from your P-K Distributor, or write: Parker-Kalon Division, General American Transportation Corporation, 200 Varick St., New York 14.

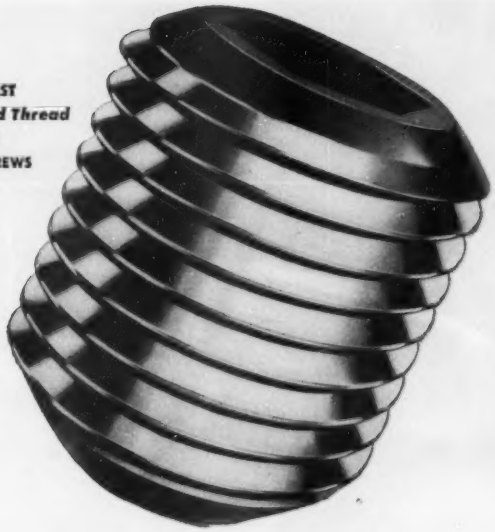
for all the essentials of cost-wise assembly

PARKER-KALON®



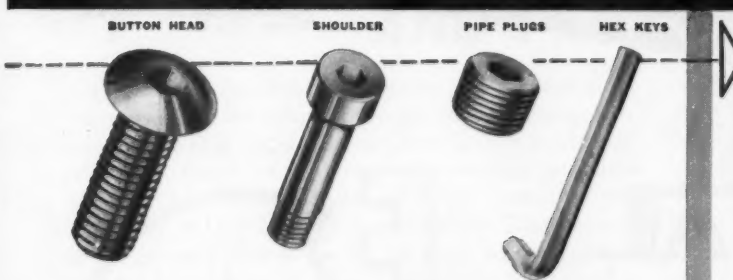
IN STOCK for immediate delivery — see the nearby P-K Socket Screw Distributor —

THE FIRST
Ground Thread
SOCKET
SET SCREWS



THE ONLY
Size-Marked
SOCKET
CAP SCREWS

SOCKET SCREWS



your local Supply and Service Specialist

In Socket Set Screws PARKER-KALON gives you

- **GROUND THREADS** — at no extra cost. Gage-like precision, mirror-smooth finish — uniform, dependable Class 3 tolerance. Mechanics like their easy starting, easy keying.
- **PROVED ASSEMBLY STRENGTH** The "proving ground" is the millions of assemblies made by thousands of satisfied users of P-K Socket Screws, whose products are used everywhere, many under the toughest conditions of vibration.

In Socket Cap Screws PARKER-KALON gives you

- **SIZE-MARK** — offered only by P-K. Incised on the head of each screw, it saves time and wasted screws when sizes get mixed up, prevents errors by green help. Maintenance and service men like Size-mark, it helps in reassembling.
- **GEAR GRIP** Meshing firmly with finger tips, it prevents slipping and fumbling when hands are oily, speeds starting.
- **MAXIMUM STRENGTH** Head, socket, and threads are accurately formed by Parker-Kalon's cold-pressure process. Steel structure "flows" to conform to all contours, assures maximum strength at points of greatest stress.

In all Socket Screws PARKER-KALON gives you

- **GUARANTEED FIRST QUALITY** Based on tests and inspections at every step in production — an exacting routine of quality control supervised by P-K laboratory Technicians.
- **FULL RANGE OF STYLES AND SIZES** You'll find any Socket Screw you need, NC or NF, in P-K's complete line, and Hex Keys in all sizes, and in several handy sets. Ask your P-K Distributor for the P-K Price List, Catalog, — any information you need. Slide chart Socket Screw Dimension Finder Free.

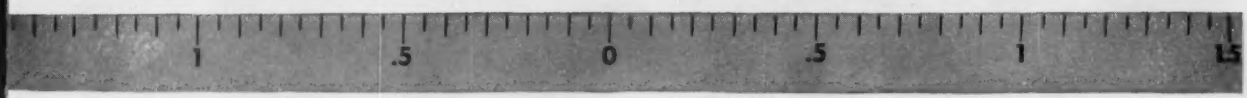
ONLY DIMENSIONAIR

Approximately half actual size
Weight 17¾ lbs.

FEDERAL

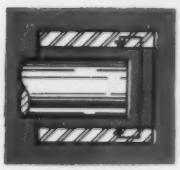
Largest manufacturer devoted exclusively to designing and manufacturing *all types* of DIMENSIONAL INDICATING GAGES

Gives You ALL This...



FULL 7½" SCALE OF CALIBRATED ACCURACY→

ALL OF IT measures accurately. Not just part of it!

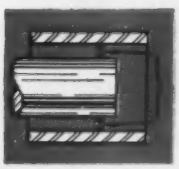


LONGER APPROACH RANGE

You begin to measure earlier BEFORE reaching minimum work size. Less scrap. Easier to insert plug. Same plug can be used on both rough and finished dimension. Total minus range .0015".

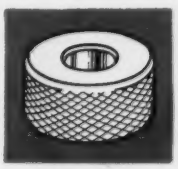
STAY-PUT ZERO — DON'T WORRY ABOUT PRESSURE FLUCTUATIONS

They do not affect accuracy. Set zero when you start—that's all. No drifting.



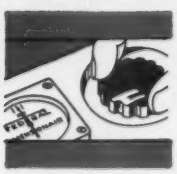
GREATER CLEARANCE — REGULARLY .0018" up to .0038"

You can read Undersize, Taper, Out-of-Round and Irregular Shape Holes without plug getting stuck. Easier to insert plug.



ONE MASTER ONLY — FORGET THE IDEA TWO ARE NEEDED

Only air gage built with enough precision to permit use of only one master. Just like any other precision instrument.



10 SECOND SET-UP — JUST ONE ADJUSTMENT

As simple as setting a Dial Indicator. Direct and Positive.

LONGER PLUG WEAR — JET FACES ARE DEEPER

Saves you real money.

INTERCHANGEABLE PLUGS — WITHOUT MAJOR ADJUSTMENT

Every measuring plug calibrates on same scale.

MORE SENSITIVE — TO SIZE VARIATIONS

Fully Jeweled Cushioned Movement. Highly sensitive but rugged for shop use. Meter pointer cushioned at both ends of travel.

TRY IT— AND PROVE IT TO YOURSELF

The basic design of the Dimensionair is unique. It alone makes possible the many important features above. Customers who have first given the Dimensionair a thorough trial have found its advantages outstanding and have ordered many Dimensionairs in large quantities, and repeatedly. We invite you to try the Federal Dimensionair and compare it with any other air gage. Ask our nearest representative or mail the coupon today for complete information and prices. FEDERAL PRODUCTS CORPORATION, Providence 1, Rhode Island.

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4123 Eddy Street, Providence 1, Rhode Island

Send me your New Air Gage Catalog.

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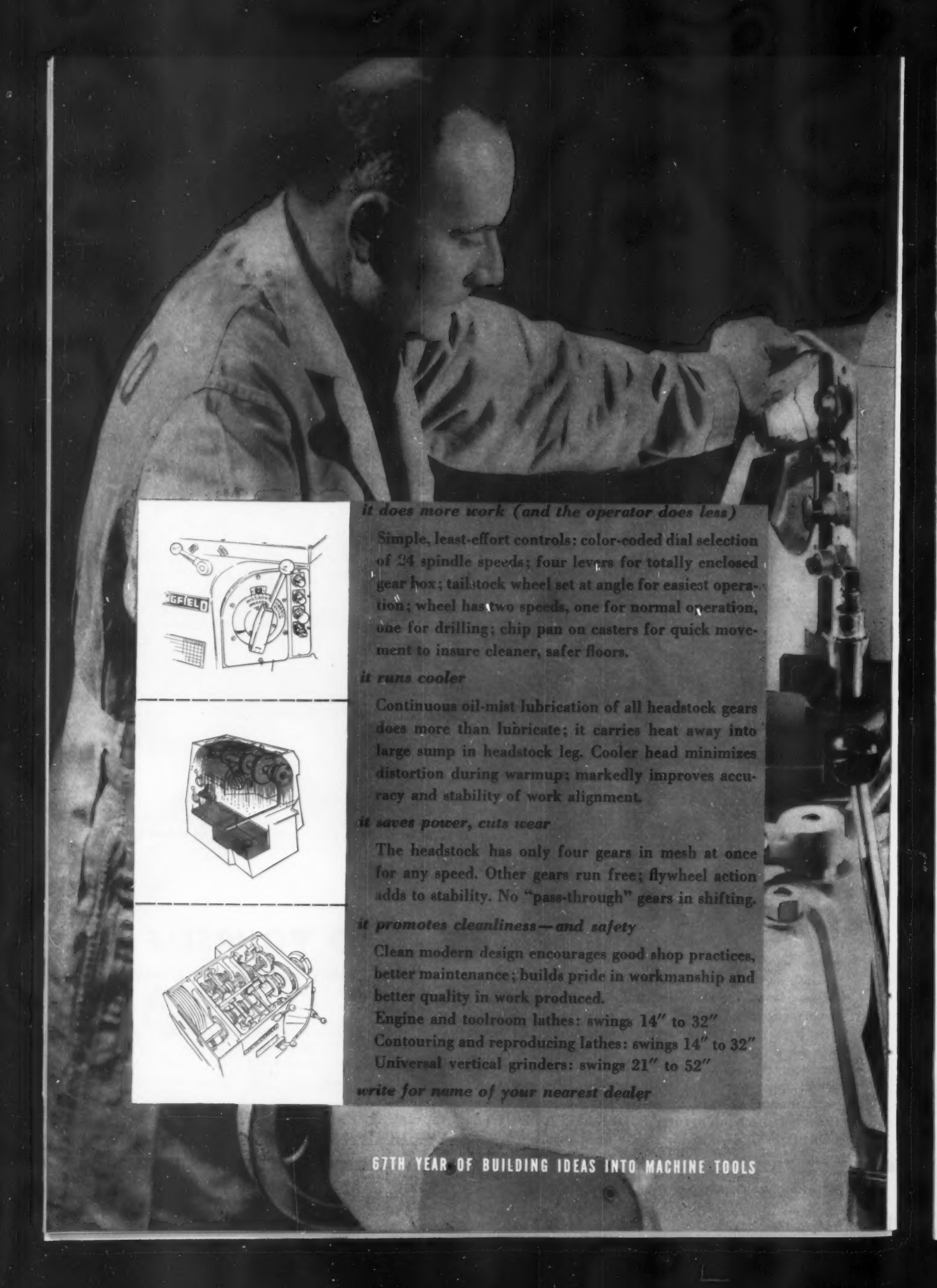
COMPANY.....

STREET.....

CITY.....

STATE.....



it does more work (and the operator does less)

Simple, least-effort controls: color-coded dial selection of 24 spindle speeds; four levers for totally enclosed gear box; tailstock wheel set at angle for easiest operation; wheel has two speeds, one for normal operation, one for drilling; chip pan on casters for quick movement to insure cleaner, safer floors.

it runs cooler

Continuous oil-mist lubrication of all headstock gears does more than lubricate; it carries heat away into large sump in headstock leg. Cooler head minimizes distortion during warmup; markedly improves accuracy and stability of work alignment.

it saves power, cuts wear

The headstock has only four gears in mesh at once for any speed. Other gears run free; flywheel action adds to stability. No "pass-through" gears in shifting.

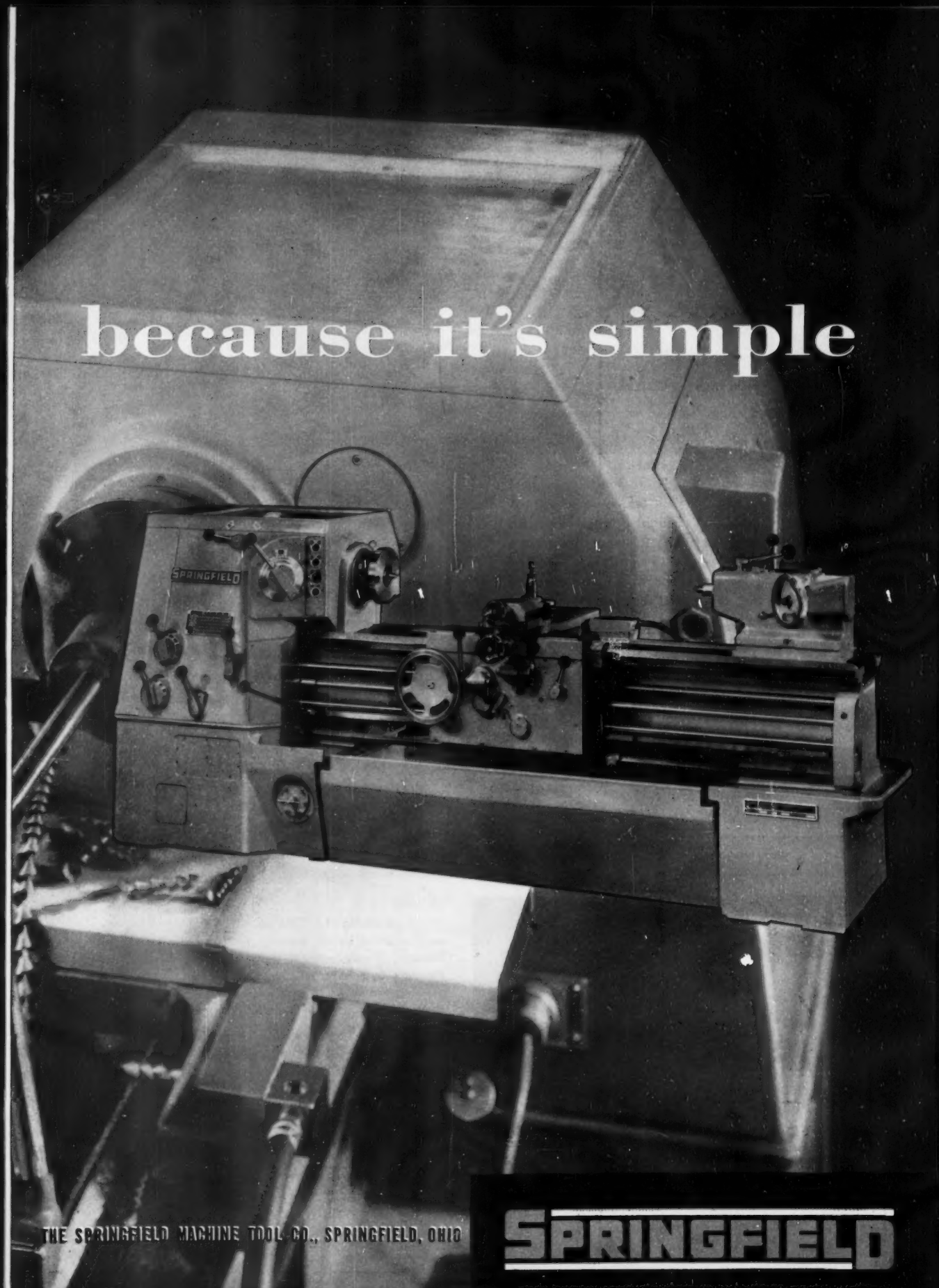
it promotes cleanliness—and safety

Clean modern design encourages good shop practices, better maintenance; builds pride in workmanship and better quality in work produced.

Engine and toolroom lathes: swings 14″ to 32″
Contouring and reproducing lathes: swings 14″ to 32″
Universal vertical grinders: swings 21″ to 52″

write for name of your nearest dealer

67TH YEAR OF BUILDING IDEAS INTO MACHINE TOOLS


because it's simple
SPRINGFIELD
THE SPRINGFIELD MACHINE TOOL CO., SPRINGFIELD, OHIO
SPRINGFIELD

THOUAND IN $AVING$

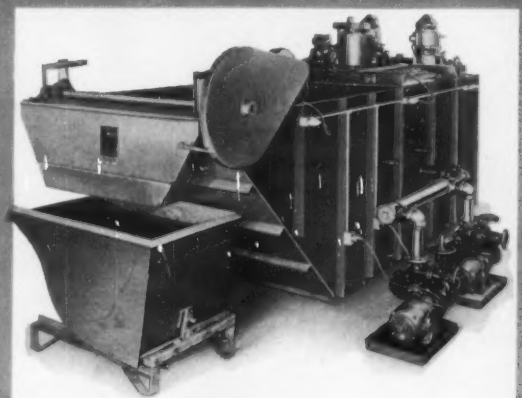
can be yours with a HOFFMAN central flotation system

HERE'S THE REASON WHY

Every metal-working day machinist man-hours formerly lost to down-time are being saved, expensive cutting tools assured a longer life, and sump cleaning and other maintenance costs are being slashed! How? With the Hoffman Central Flotation System that hundreds of plants are using for automatic, centralized removal of chips and grit from coolants.

THESE ARE THE RESULTS

- Increased Production
- Lower Maintenance Costs
- Oil and Coolant Savings
- Longer Tool Cutting Life
- Uniform Quality Control
- Improved Finish

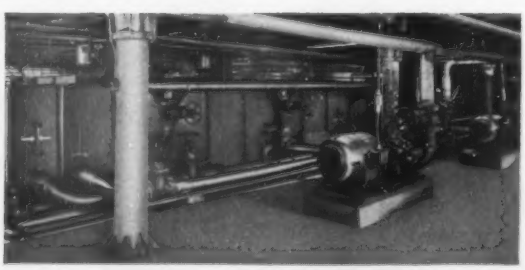


"Push-button" operation
The only fully automatic coolant clarification process on the market today!

Effectively removes waste solids from water and soluble oil coolants!

Models from 20 to 1,500 g.p.m.!

HERE'S PROOF



An annual saving of $71,942.61! This is an actual experience reported by the International Harvester Company, Chicago, Illinois, after it installed a Hoffman Central Flotation System to filter the coolant for twenty-eight grinding wheels in its Mower Guard and Knife Department. Write today for Bulletin FSP3 for the complete International Harvester Case Study giving full details.

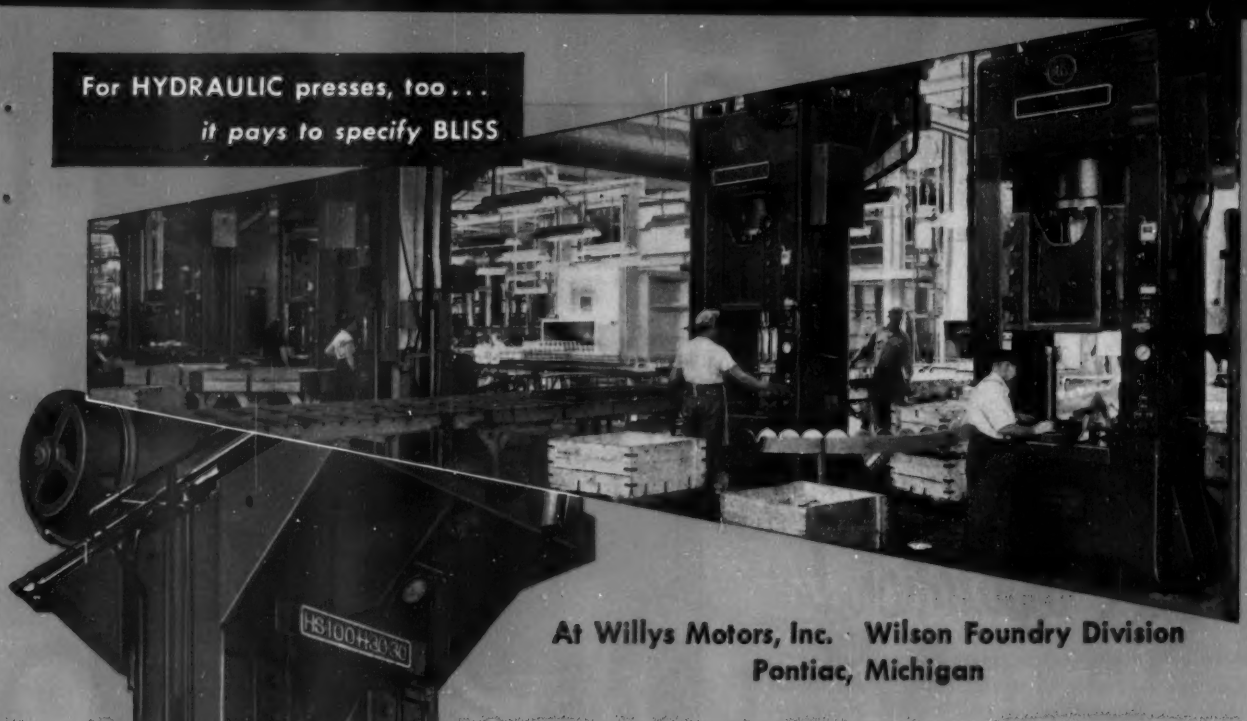
View of Hoffman Central Flotation System at International Harvester Plant, Chicago, Illinois.

Hoffman INDUSTRIAL FILTRATION DIVISION

INDUSTRIAL FILTRATION EQUIPMENT & ENGINEERING

IN CANADA: Canadian Hoffman Machinery Co. Ltd. U. S. HOFFMAN MACHINERY CORP., 241 LAMSON STREET, SYRACUSE 6, N. Y.

For HYDRAULIC presses, too . . .
it pays to specify BLISS



At Willys Motors, Inc. · Wilson Foundry Division
Pontiac, Michigan

9 BLISS HYDRO-DYNAMIC PRESSES give fast, versatile production of 90 mm. cartridge cases

Wilson relies on a battery of nine Bliss Hydro-Dyamic presses to keep 90 mm. cartridge case production rolling. In all pre-cupping, drawing, pre-heading, heading and tapering operations, their range of 100- to 2500-ton Bliss presses has proved fast, versatile and easy to work with.

And that's true not only in armaments, but in the aeronautical, automotive and other industries as well: more and more firms find that the Bliss Hydro-Dynamic presses offer the speed, versatility and accuracy they need. For complete information about the many standard and special-purpose Hydro-Dyanamic presses, write or wire for copies of our 36-page Catalog 30-A.

BLISS **on your press is more than a name . . . it's a *guarantee***

E. W. BLISS COMPANY, Canton, Ohio

PRESSES, ROLLING MILLS, SPECIAL MACHINERY

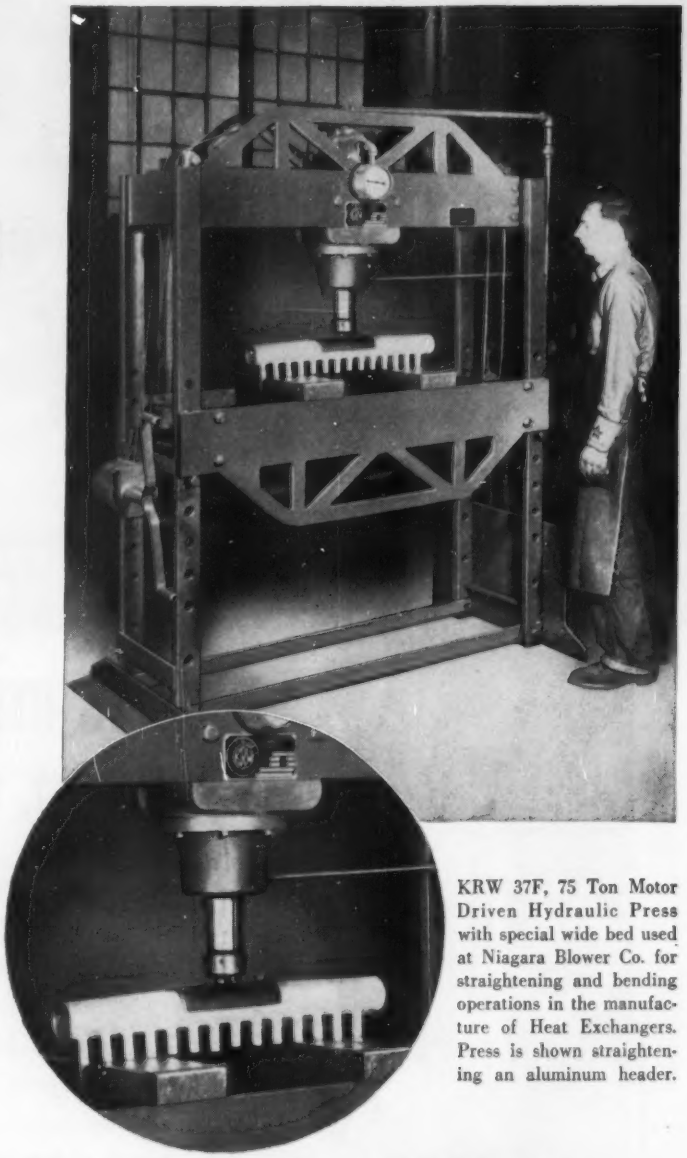
Subsidiary: The Die Supply Company, Cleveland, O. • E. W. Bliss (England) Ltd., Derby • E. W. Bliss Company (Paris) France

U. S. Plants in Canton, Salem and Toledo, Ohio; Hastings, Michigan; and San Jose, Calif. *Branch Offices* in Chicago, Cleveland, Dayton, Detroit, Indianapolis, New Haven, New York, Philadelphia, Rochester, Toledo; and Toronto, Canada. *West Coast Representatives:* Moore Machinery Co., Los Angeles and San Francisco; Star Machinery Company, Seattle. *Other representatives throughout the world.*

Another KRW HYDRAULIC PRESS living up to it's reputation!

Like most metalworking plants, Niagara Blower Co. has a number of straightening problems in their operations — pieces that warp or bend out of shape after punching or welding. And Niagara solves these problems with this KRW motor-driven hydraulic press. It is used for straightening headers, header ends, bar irons, and other components of the company's line of heat exchangers. Niagara officials tell us that this KRW Press has really lived up to its reputation for speed, accuracy and versatility. They especially like two features of their KRW Press: the ease and accuracy with which the ram can be inched down to the work and the speed with which it converts from one set-up to another.

Let KRW help with your pressing problems. We make a full line of one, two and three cylinder Hydraulic Presses; 25-150 ton capacities; hand, air or motor-driven. Check with your Machinery dealer or write us for literature and prices.



KRW 37F, 75 Ton Motor Driven Hydraulic Press with special wide bed used at Niagara Blower Co. for straightening and bending operations in the manufacture of Heat Exchangers. Press is shown straightening an aluminum header.

ONLY KRW GIVES YOU ALL THESE FEATURES:

- **Heavy Construction Throughout.** Bed and Crown Members Truss Reinforced for Added Stiffness and Strength. A KRW Exclusive Feature.
- **Any Tonnage Pressure** up to Rated Capacity can be Obtained Quickly and Selected Pressure Locked for Repetitive Operations.
- **One Swinging Ball Arm** Controls Motion of Ram Downward, Holds Pressure on Work, or Returns Ram.
- **Excellent "Inching" of Ram** Because Motor Runs Only When Operator Moves Ball Arm for Downward Ram Travel.
- **Spring Return of Ram** Gives Maximum Speed on Up-Stroke.
- **Highest Quality** Radial Type Hydraulic Pump.
- **Direct Connected Motor Drive** Through Flexible Coupling.
- **Two Speed Hand Pump** also Furnished on Motor Driven Presses in this series.

K·R·WILSON

210 Main Street, Buffalo 3, N. Y.

Designers and Builders of the Right Hydraulic Press to Solve Your Metal-working Problems!

It MUST have been good!

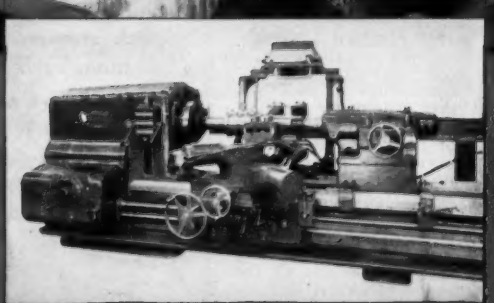
There are times when expressions speak louder than words.

Here's a group of distinguished steel mill roll executives watching a demonstration on a 26" Capacity "AMERICAN" Hydraulic Roll Lathe—judge for yourself whether or not they are satisfied with what they saw.

These machines are performing "miracles" in savings in many of the best known roll shops in the country. They have introduced a brand new machining technique that has revolutionized the art of roll turning. They reproduce work shapes from a template faithfully and accurately not only on steel mill roll bodies and necks, but on such work as spindles, motor shafts, valve stems, step shafts, piston rods, axles and a wide variety of chucking work having irregular contours.

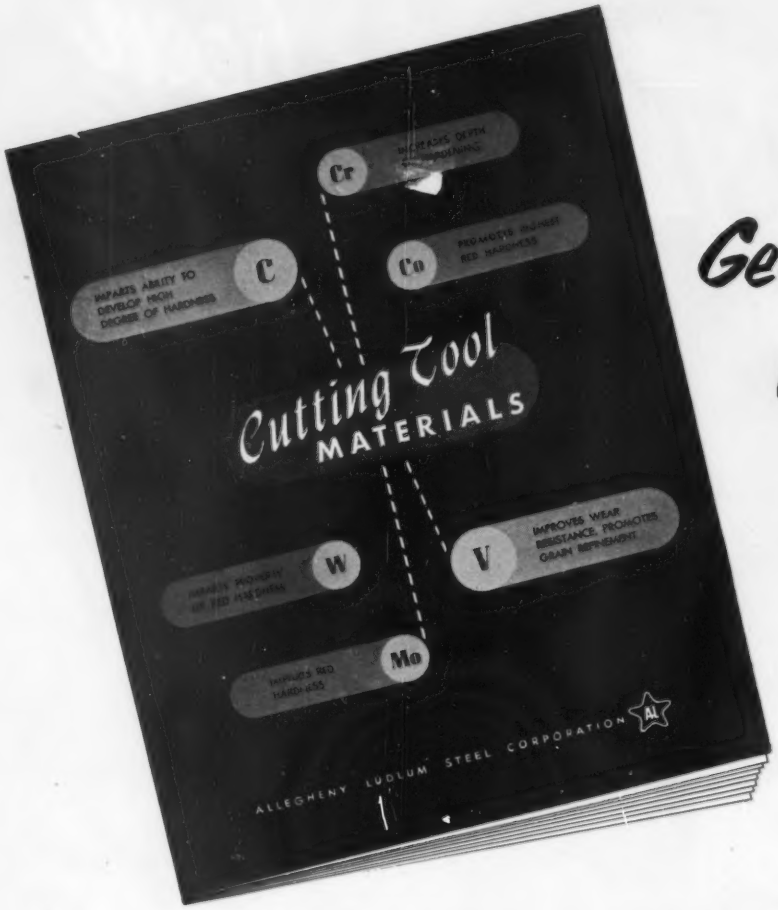
Evidence from hundreds of installations proves beyond a shadow of a doubt their leadership as top-flight cost reducers. Was there ever a time when cost reduction was more urgently needed?

If it's proof you want just drop us a line—no obligation.



THE AMERICAN TOOL WORKS CO. Cincinnati 2, Ohio, U. S. A.

LATHES AND RADIAL DRILLS



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WRITE FOR IT TODAY!

LOOK in this BOOKLET

when you're *puzzled about Tool Materials!*

A-L OFFERS YOU
Complete Service for Modern Tooling

By "complete" is meant that Allegheny Ludlum produces the full range of modern cutting tool materials, hence is in position to know and recommend the type best suited for any stated purpose. Unbiased content makes the 8¼" x 11" booklet, shown, all the more valuable. Specify its title, "Cutting Tool Materials."

Address Dept. AM-511

You should have a personal copy of this 36-page booklet close at hand, if you are continually running into new cutting problems. Use it as a guide to quick answers to scores of possible questions such as:

"Should we use *Carbide* on this job? What grade?" . . . or, "How about tooling up with *Cast Alloy* for that other run?" . . . or, "Can we cut this extra-tough stock fast enough with our usual grade of *High Speed Steel?*"

This booklet in no way replaces, but does supplement, what you can learn by practical experience or what you can gain by calling in an A-L tool engineer. In compact form and quite impartially, the booklet presents the basic facts that enable you to speedily compare the suitability of various tool materials for specific uses. *Send today for your free copy.* There is no obligation involved.

● *Allegheny Ludlum Steel Corporation, Henry W. Oliver Bldg., Pittsburgh 22, Pa.*

For complete **MODERN** Tooling, call

Allegheny Ludlum

WAD 3703

AL
FINE TOOL STEELS
SINCE 1854

NICHOLS TWIN MILL

two heads are better than one .... for sure!

The Nichols Twin Mill is something new in duplex millers — a precision 2-spindle bed-type miller designed for simultaneous light duty milling of opposite or adjacent surfaces, using **horizontal or vertical spindles.**

The Twin Mill provides unmatched flexibility! It is equally adaptable for long-run or short-run jobs. The two geared milling heads are independent units, with separate 1 HP motor drives, and are quickly adjusted either directly opposed or offset longitudinally, vertically or transversely. Set-up is fast and simple.

The wide range of spindle speeds from 55 to 2050 R.P.M. allows milling of ferrous or non-ferrous materials with high speed or carbide tipped cutters, producing EXTRA FINE FINISH while maintaining the closest tolerances with ease.

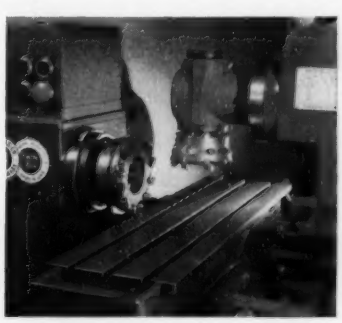
The Twin Mill is completely push-button controlled, arranged for automatic table cycling — with rapid approach, hydraulically controlled variable cutting feed and rapid return. Available with automatic retraction of milling heads, automatic spindle brakes and carefully engineered special features to meet specific applications.

The parts shown are typical of those on which the Twin Mill is cutting costs and boosting production. Investigate the savings it can make for you. For details write to:

Manufactured by W. H. Nichols Company, 48 Woerd Avenue, Waltham 54, Mass.

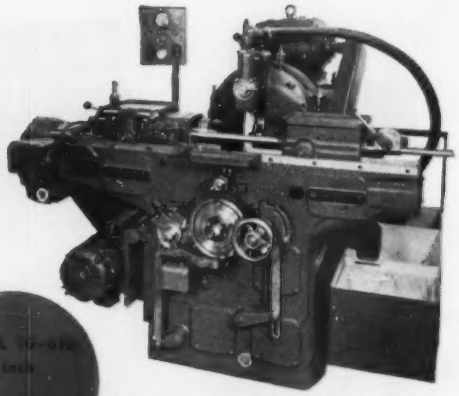
CONDENSED SPECIFICATIONS

Table, working surface	8⅝" x 30"
Table Travel—cutting stroke	11¾"
Motors	(two) 1 HP
Spindle Speeds (15)	from 55 to 2050 RPM
Max. height center of spindle above table	11¾"
Max. offset of spindles (horizontal)	8½"
Max. distance between spindle noses (across table)	16"
Floor space required	64" x 56"



ASTE SHOW
Booth 1431

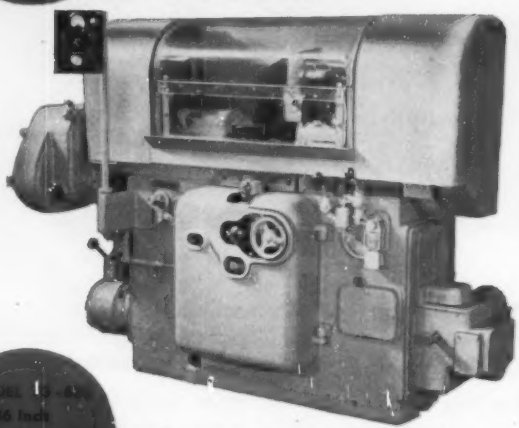
76-F Mamaroneck Ave. **NICHOLS-MORRIS CORPORATION** **White Plains, New York**



Quality threading
AT MINIMUM COST

MODEL [illegible]
6 x 15 inch

The 6 x 15 [illegible] Automatic Thread Grinder is used for high [illegible] thread grinding with either single or multi- [illegible] wheels on relatively small parts.



MODEL [illegible]
6 x 36 inch

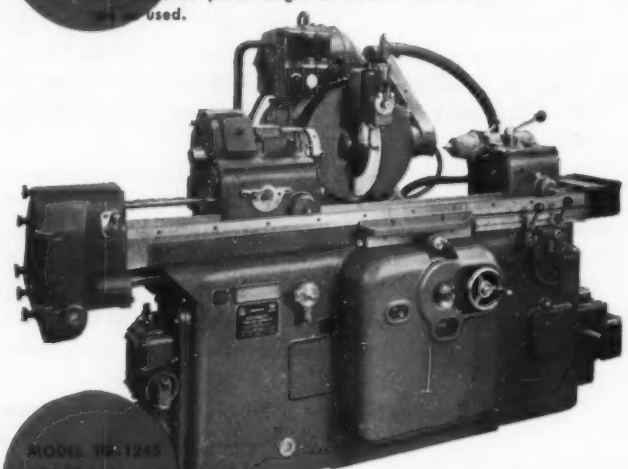
The 6 x 36 [illegible] machine is extremely versatile and is used on long [illegible] short run jobs on a great variety of precision [illegible] ded parts. Single or multi-ribbed wheels [illegible] used.

JONES & LAMSON
AUTOMATIC THREAD GRINDERS:

- Produce threads of better quality and more uniform finish
- Reduce handling cost
- Eliminate costly rethreading after heat treatment
- Eliminate expensive retooling when specifications change
- Reduce cost of gage maintenance

Built-in accuracy and automatic features, make any of these machines a paying investment for toolroom or production line.

- Automatic wheel truing
- Automatic infeed on successive cuts
- Automatic sizing
- Rheostat wheel speed control
- Diamond or crush dressing of wheels
- Multi-ribbed threading
- Right and left hand threading



MODEL [illegible]
12 x 45 inch

The 12 x 4[illegible] machine is used for grinding threads on a wide [illegible] of work from small to large heavy parts. [illegible] multi-ribbed wheels can be used.

When measuring the value of a thread grinder remember the extra benefits of J & L top-flight construction. Write Dept. 710 for illustrated catalog.

JONES & LAMSON

Machine Tool Craftsmen Since 1835

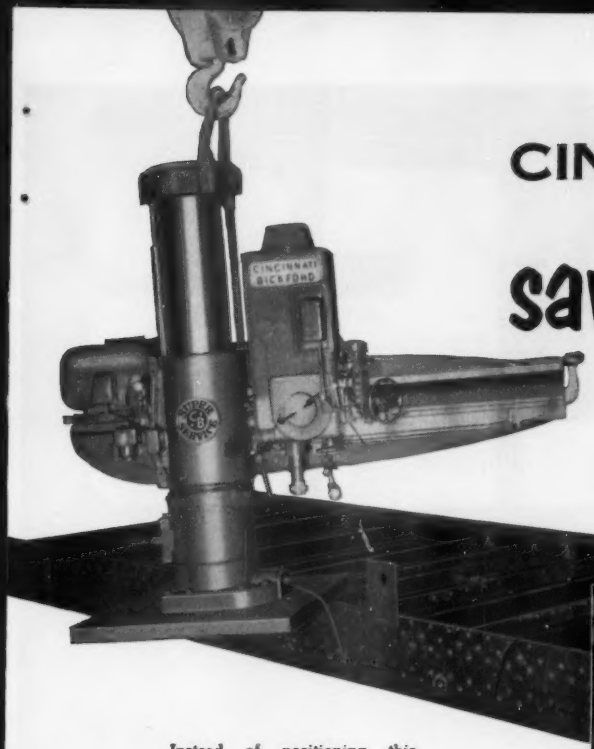
JONES & LAMSON MACHINE CO., 502 Clinton St., Dept. 710, Springfield, Vt., U.S.A.

THREAD GRINDER DIVISION

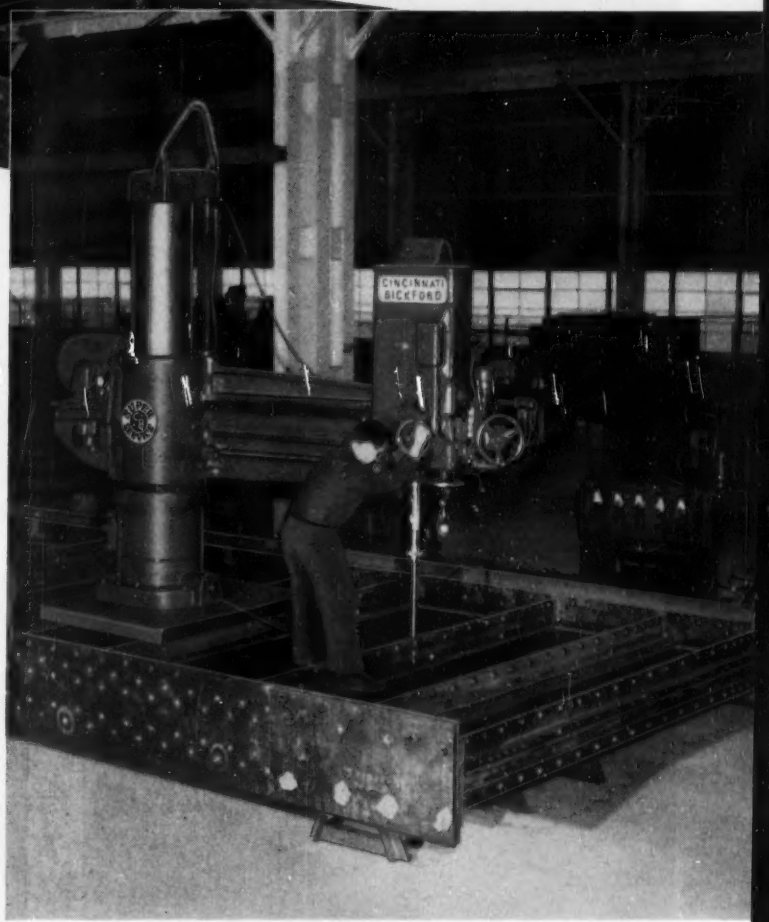
CINCINNATI BICKFORD

saves 50% to 75%

AT LINK-BELT COMPANY



Instead of positioning this 57,100 pound girder for drilling operations, the machine is moved by crane to the job.



This 6-foot arm, 17-inch diameter column Cincinnati Bickford Super Service Radial Drill is equipped with a lifting bail for portable use on large structural members and base plates where it is much faster to move the machine than the work. The machine is never clamped to the piece or floor for these portable drilling operations since it is properly balanced and of ample weight to neither tip nor rise up while drilling. Various sizes of holes are drilled in the part shown. Savings of 50 to 75 per cent over the previous method which used two men and a portable air drill, have been effected.

Photos made at the new Link-Belt Company plant in Colmar, Pa.

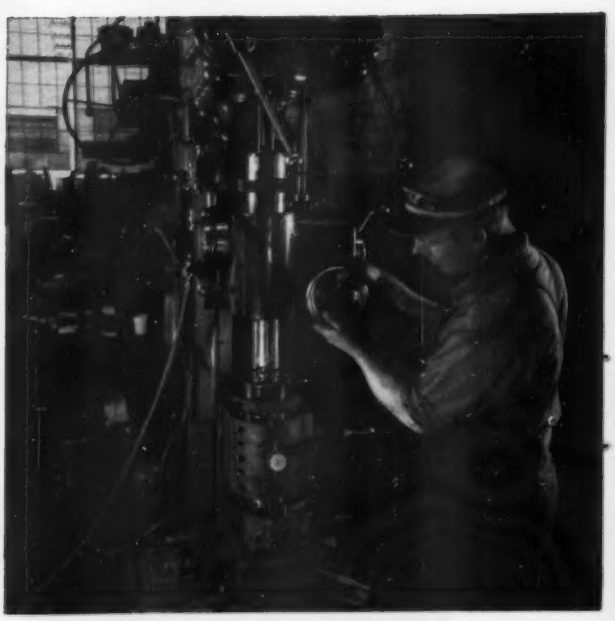
CINCINNATI BICKFORD

RADIAL AND UPRIGHT DRILLING MACHINES

THE CINCINNATI BICKFORD TOOL CO.

Cincinnati 9, Ohio, U.S.A.

HOLES



costing too much?

NOT WITH CLEEREMAN

DRILLING MACHINES

Low cost holes require working drills at top efficiency. The built-in capacity and power of Cleereman Drilling Machines is greater than needed today with reserve for the tools of tomorrow.

- ✓ **Operate at maximum speeds**
- ✓ **Operate at maximum feeds**
- ✓ **Operate with maximum convenience**
- ✓ **Operate with minimum maintenance**

There is an enthusiastic user near you. Ask him about his hole cost. We will gladly furnish a list of installations.

BRYANT Machinery & Engineering Company
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CLEEREMAN MACHINE TOOL CO. Green Bay, Wisconsin

BUILDERS OF PRECISION JIG BORERS AND DRILLING MACHINES

GISHOLT

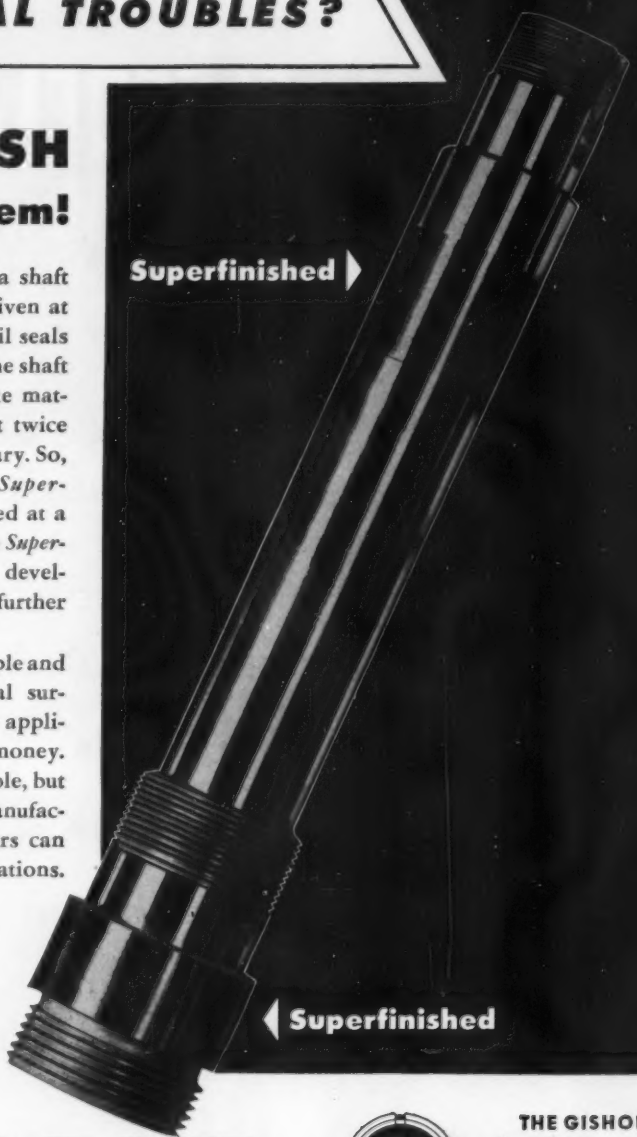
do you have
OIL SEAL TROUBLES?

SUPERFINISH
can solve them!

Here's a typical case where a shaft with ground surfaces was driven at a speed of 1750 r.p.m. The oil seals created enough heat to burn the shaft and stop the motor. To make matters worse, it was found that twice the original speed was necessary. So, the oil seal surfaces were *Superfinished,* and the shaft operated at a speed of 3500 r.p.m. With the *Superfinished* surfaces, no heat was developed at this higher speed. No further trouble was encountered.

Superfinishing is a quick, simple and inexpensive process. Oil seal surfaces are but one of the many applications where it can save you money. Not only can it eliminate trouble, but often it can help you reduce manufacturing costs. Gisholt engineers can advise you regarding its applications.

Write now for the booklet "Wear and Surface Finish."



GISHOLT MACHINE COMPANY Madison 10, Wisconsin

THE GISHOLT ROUND TABLE

represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

COUNTERBORES
with
Interchangeable Pilots

There is nothing like on-the-job performance to prove Butterfield's superiority.

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TAPS • DIES • DRILLS • REAMERS • COUNTERBORES • SCREW PLATES

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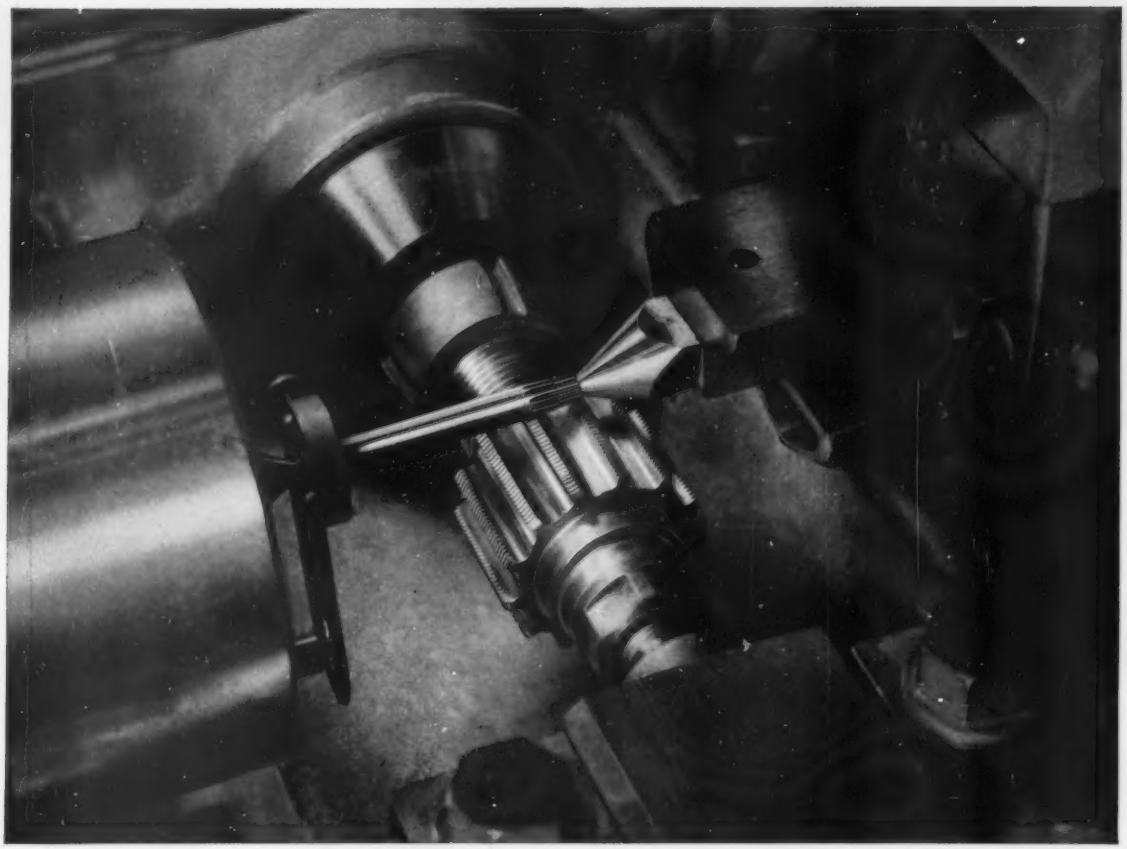


Consistently Better Gears
WITH CLASS AA HOBS

Specialists in the field of instrument gears, G-M Laboratories, Chicago, Illinois employ the latest precision techniques to assure consistent accuracy in their work. Their modern gear department is completely temperature and humidity controlled, and Precision Type Barber-Colman Hobbing Machines are used.

To produce the finest gear accuracy, this firm has standardized on the use of Class AA hobs with taper bores for their precision work. Experience has shown that Barber-Colman Precision No. 6-10 Hobbing Machines, in combination with Class AA hobs, give them the most accurate tooth form and spacing. All gears are finish hobbed, without further finishing operations. Tolerances on the pinions shown here consistently check within .0003" tooth-to-tooth composite error, and .0006" total composite error.

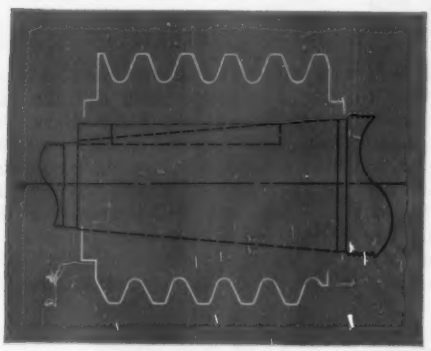
BUILDERS OF PRECISION GEAR

GREATER NUMBER OF CLOSE TOLERANCE GEARS USING CLASS AA HOBS

Although the hob is not the only factor affecting the accuracy of gears, it does have an important effect, particularly upon the profile of the gear tooth. Class AA hobs are made to consistently closer tolerances than any other hobs, and have proved themselves in actual production for many years. Performance records show that, per sharpening, Class AA hobs produce more gears with close tolerances than any other hobs.

Class AA hobs are recommended for the utmost in precision, where other conditions warrant the use of a tool of this class. This accuracy in the tool, however, may be lost if the hob is not properly mounted or trued on the machine. Because of this, Class AA hobs are recommended with taper bores. The taper makes it much easier to true hobs on the arbor where high accuracy requirements are demanded. Compared with the sliding contact on straight hole hobs, the taper provides metal-to-metal contact, eliminating the possibility of an increase in runout during the cutting operation. Time is also saved for the operator because the hob will run as true as the spindle.

TAPER BORES RECOMMENDED . . .



Production-line accuracy in all metal cutting operations is constantly approaching closer limits, Gear hobbing is perhaps the outstanding example When you have gear tooth problems be sure to ask Barber-Colman Hobbing Engineers to work with you. Their long experience in gear cutting is available to you without cost or obilgation.

Write for a copy of Hobbing Notes — *"Hobbing Accurate Gears"*

HOBS • CUTTERS • REAMERS
HOBBING MACHINES
HOB SHARPENING MACHINES

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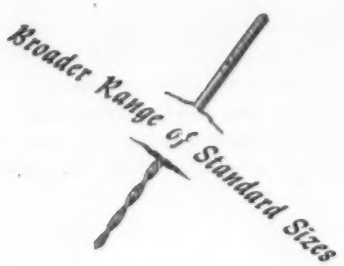
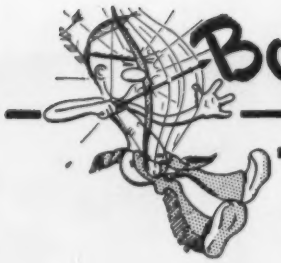
GENERAL OFFICES AND PLANT, 717 ROCK STREET, ROCKFORD, ILLINOIS

HOBS AND MACHINES SINCE 1911

L&I Reamers give you more



L&I
The Reamer Specialists
LAVALLEE & IDE, INC.
CHICOPEE, MASS.



Backlash

EXTRACTS FROM CURRENT LETTERS TO THE EDITORS

A B C

I'm lost among the multiple multitude of mumbo-jumbo abbreviations. Why hesitate to institute a mandatory policy of beginning each article or page with the abbreviations used therein, and their meaning?

For example, AFL stands for American Federation of Labor, but what about NATO, NTDMA, WSB, NAM, IUE-CIO, NLRB, DMPA, BLS, and GSA?

C Roy Barber
San Diego, Calif

We have always felt that some of these abbreviations were so well known that no explanation was necessary as, for example AFL. *With the less familiar ones, we try to spell out the full name the first time it occurs in a story, use the abbreviation from then on. It may be, however, that we sometimes fail to do this because so many of them are virtually household words with us.* NATO *is North Atlantic Treaty Organization;* NTDMA *is National Tool and Die Manufacturers' Association;* WSB *is War Surplus Board;* NAM, *National Association of Manufacturers;* IUE-CIO, *International Union of Electrical, Radio, and Machine Workers—Congress of Industrial Organizations;* NLRB, *National Labor Relations Board;* DMPA, *Defense Mobilization Production Authority;* BLS, *Bureau of Labor Statistics;* GSA, *General Services Administration; and, of course,* AM *stands for American Machinist.*

Maybe CRB *(C Roy Barber) has a good idea. Maybe other readers are puzzled by these initials. If there is a general demand for it, we will be glad to publish a glossary or, at least, make sure we have spelled out the name in full the first time we use it in an article. Let us have your opinion.*—Ed.

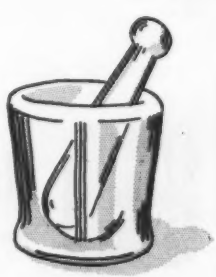
Utopia?

As one who uses a machine tool every day, I disagree with Mr Blackall (*AM*—Dec 21 '53, p109). Sure, I'm only a working stiff operating a small turret lathe, but I swing the spokes of that handwheel back and forth all day long, put on the pressure at the end of the stroke, swing it back again to index the turret, and do it again. Then I turn the cross-feed screw to

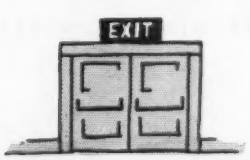
GRINETICS

By D G SMITH

LABOR SAVING



CENTERLESS GRINDER



BLOW VALVE

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OHIO FORGE AND MACHINE

OHIO F&M CO.

eliminates two grinding operations

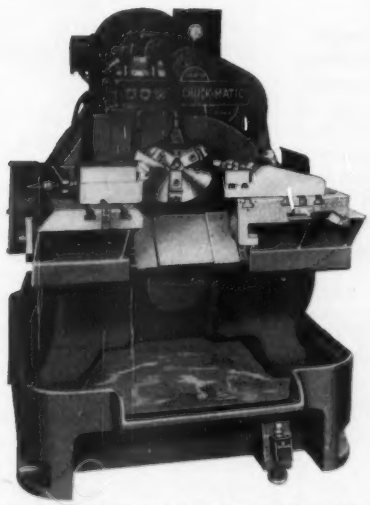
machining high precision diesel engine gear blanks

Machined on **CHUCK-MATIC** from A-4340 steel forging annealed.

1st operation: (on front side) Face hub and flange, form radius on O.D; bore and chamfer hole, turn O.D. partway.

2nd operation: (on other side) Face, finish bore and turn O.D. remainder.

ON ACME-GRIDLEY CHUCK-MATICS



Acme-Gridley 12" Single Spindle CHUCK-MATIC is radically different from any other machine heretofore offered for short length primary operations such as forming, turning, drilling, straight or taper boring, facing, etc.

By switching these jobs to Chuck-Matics, Ohio Forge and Machine Corporation in Cleveland, Ohio, now machine tough forged blanks concentric within .0002"—hold tolerances which eliminate the green (or soft) grinds previously required on bore and O.D. before the teeth could be cut.

And they save, too, with automatic control of cycle time—a predetermined machining rate that you can count on for every piece.

This Radically Different Chucker

is built for high speed precision work on heavy duty jobs. Check these features against your present methods—

- **automatic control of machine time cycle**
- **easy to set up and retool**
- **does not require skilled labor—one man operates as many machines as cycle times of jobs permit**
- **is space saving—only 45" wide, 64" long**
- **precision work at speeds and feeds as fast as carbide tools can take it.**

—then write for catalog SC-46. Or, better still, ask us to talk it over.

Nothing so completely destroys profits as the continued use of obsolete equipment

The NATIONAL ACME COMPANY

170 EAST 131st STREET • CLEVELAND 8, OHIO

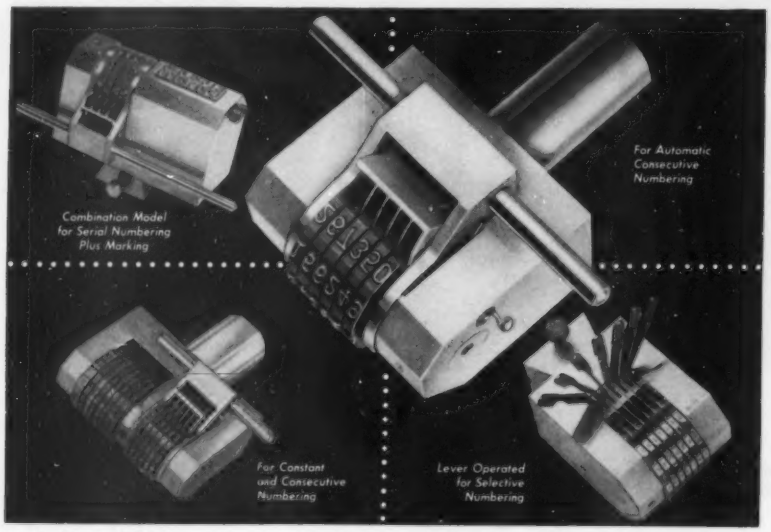
ACME-GRIDLEY BAR and CHUCKING AUTOMATICS
1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • Limit, Motor Starter and Control Station Switches • Solenoids • Contract Manufacturing

1 2 3 4 5 6
1 2 3 4 5 7
1 2 3 4 5 8
1 2 3 4 5 9
1 2 3 4 6 0
1 2 3 4 6 1
1 2 3 4 6 2

NOBLEWEST

Precision

NUMBERING HEADS


Combination Model for Serial Numbering Plus Marking
For Automatic Consecutive Numbering
For Constant and Consecutive Numbering
Lever Operated for Selective Numbering

1 2 3 4 6 3
1 2 3 4 6 4
1 2 3 4 6 5
1 2 3 4 6 6
1 2 3 4 6 7
1 2 3 4 6 8
1 2 3 4 6 9
1 2 3 4 7 0
1 2 3 4 7 1
1 2 3 4 7 2
1 2 3 4 7 3
1 2 3 4 7 4

FAST, accurate and dependable, Noblewest Numbering Heads are preferred by the leaders in industry. They have unlimited applications for *constant, selective* and *consecutive* numbering. Designed for use in either marking presses or Noblewest Roll Marking Machines—wherever permanent numbering is required. Available in a wide variety of automatic, non-automatic and lever operated models with number sizes from 1/40" to ½". Special numbering heads are made to any requirements including embossing heads and numbering heads combined with marking dies.

If you have a numbering problem in steel or other metals—wood, fibre, hard rubber, plastic—save time and money with Noblewest Numbering Heads. There is a Noblewest Representative near you. Write to Noble & Westbrook Manufacturing Company, 17 Westbrook Street, East Hartford, Conn.

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MARK IT BEST WITH

NOBLEWEST IMPROVED MARKING DEVICES

NOBLEWEST

ORIGINATORS OF THE ROLL MARKING PROCESS

cut off the work, open the chuck, put in another piece, and do it all over again. Believe me, I'm good and tired at the end of the day.

If I could have a machine that would do all the work by power, and all I'd have to do was to sit on my fanny and push a button, that would suit me fine. Come to think of it, why should I push the button? Couldn't that be done electronically, too? I'm all for it.

George Hutchings
Cleveland

Sounds wonderful. But if electronics are going to do all the work, when do YOU eat? You may prefer to let George do it.—Ed.

Tool Leasing Program

The Kearney & Trecker plan to lease or rent new machine tools interests me greatly and should help to improve the status of machine tool equipment when *AM* makes its next survey. Small shops, or large shops with limited available capital, should find this a way to reduce machining costs without a large capital outlay. Even plants not financially handicapped can try out new machine before making a large investment.

While the plan emphasizes the leasing of new machine tools, it would be logical to suppose that used or rebuilt machines could be supplied in a similar manner. Machines leased on this plan, and not purchased, would meet the requirements of many shops. When we consider the number of shops, many of them established years ago, which started with such poor equipment as they could afford, and grew to large institutions, such a plan offers great opportunities for beginners in today's field.

A similar plan might be practicable for some of our highly specialized machine tools, such as crankshaft lathes. In such cases it might even be advisable to furnish trained operators with the machines. With a highly trained operator the lessee would be assured of a high rate of production and less downtime than might otherwise be the case. Presumably, a trained operator would be able to keep the machine in better condition, and possibly prevent breakdowns, than one less familiar with it.

The shoemaking industry has operated with leased machinery for many

years, and apparently the practice has been profitable for both the machine builders and the shoe manufacturers. It will be interesting to see how the Kearney & Trecker plan works out in the machine tool field.

Fred H. Colvin
Point Pleasant, N. J.

America First

In a recent issue (*AM*—Feb 1 '54, p127) you published a Practical Id a on a Gearless Drillhead, as submitted by Fred Lawrence, Northumberland, England.

It perturbs me to think you would consider such an idea as being novel, considering the amount of advertising effort we have put behind our own gearless drillhead over the last six or seven years. The presentation of the idea certainly doesn't do us any harm, inasmuch as it calls to the attention the fact that there is such a thing as a gearless drillhead. But it seems to me that mention should be made of the fact that they are being produced as commercial items in this country by us, the only producers.

Frank Zagar
Gen. Mgr, Zagar Tool, Inc.
Cleveland, Ohio

In Practical Ideas (*AM*—Feb 1 '54, p127) you describe an eccentric-driven, gearless, multiple-drill head. This principle is used, I believe, in the Zagar Tool, Inc, gearless drill head. The idea is at least 30 years old, and is a good one.

However, there is one important detail the author neglected: There must be at least three eccentric cranks for the device to function properly. One can be a dummy crank, and needs no provision for thrust.

Elof B Olson
Oak Mfg Co
Chicago

Concordat

In re: The letter titled "I Don' Wann'em" from H R Crossthwaite (*AM*—Feb 15 '54, p98). Me, too!

Wm F Gross
Egg Harbor City, N. J.

ELIMINATE INSPECTION REJECTS —CAUSED BY IMPROPER DRILLING

MACHINE-GRIND *your* DRILLS with OLIVER DRILL POINTERS

MODEL #21

MODEL #510

OLIVER OF ADRIAN

Improperly ground drills make imperfect holes . . . cause rejects, production lags and increased costs. Eliminate this unnecessary bottleneck the Oliver Way:

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The balanced cut obtained with OLIVER DRILL POINTERS means that each lip of the drill does equal work—makes more perfect holes.

OLIVER machine-ground drills assure uniformity and . . . they last from 2 to 3 times longer than hand-ground drills.

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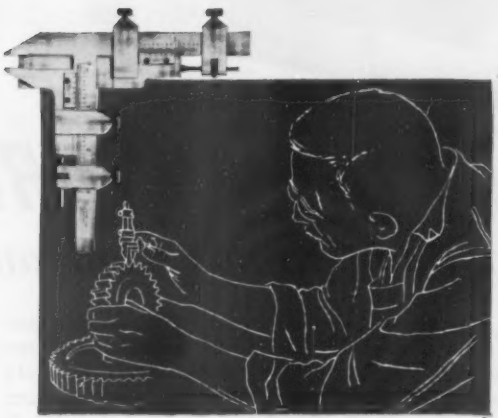
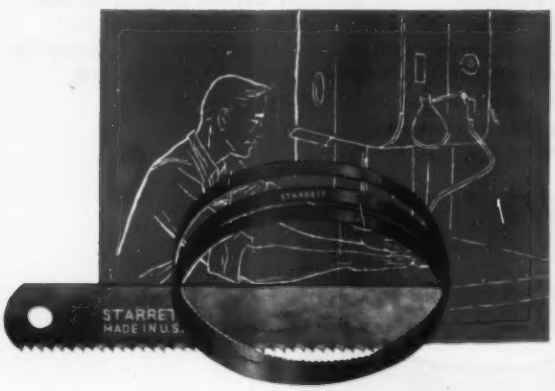
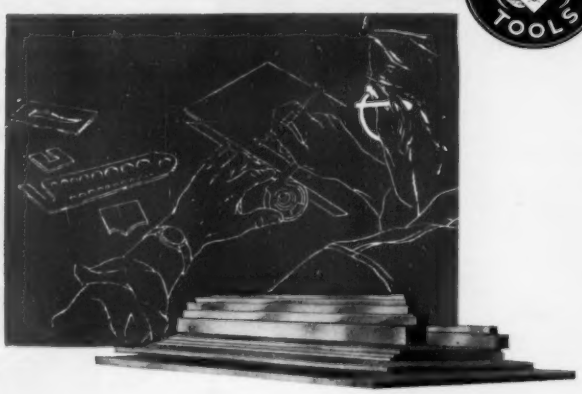
Standard for quality and precision — a complete line for every gaging or production inspection application.



USE THE SAME *Skill* IN MAKING THESE

STARRETT TOOLS





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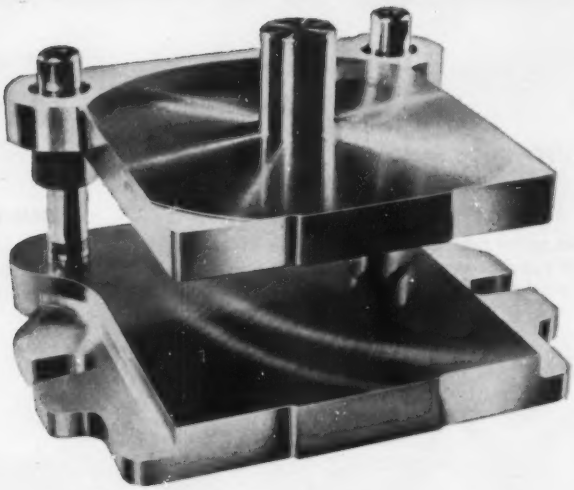

DANLY'S IN THE PICTURE

at Eastman Kodak Company

Danly Die Sets play an important role in the manufacture of Eastman's popular new Brownie movie camera and Brownie movie projectors . . . latest in the Eastman line that Danly Die Sets have helped build all through the years. Used to mount high precision dies, Danly Die Sets help bring "master die" accuracy to every finished part. But Danly Die Sets do more . . . even before a press run ever starts. They make tooling-up easier, faster—save you many, many hours in the die shop. And once in production, these same Danly Die Sets do their share to maintain non-stop production . . . save down-time . . . increase die life. And remember, Danly Die Set service is as quick and convenient as a phone call.

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INDIANAPOLIS 4	5 West 10th Street
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***LOS ANGELES** 54	Ducommun Metals & Supply Co., 4890 South Alameda
MILWAUKEE 2	111 E. Wisconsin Avenue
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**Indicates complete stock.*

• Spot News of Metalworking . . .

- **Powdered metal piston rings will be produced this year** at Thompson Products' new St Louis plant. Rings will have same composition as cast iron — iron and graphite, but proportions will differ (cast iron can hold only 4½% graphite in molten state, 3% at room temperature). With powdered metal technique any proportions of the two metals can be pressed together, sintered at 1600 F, to produce 20% graphite rings.

- **Excess Profits Tax more than tripled plant expansion spending** at Square D Co, Detroit, during the period 1940-1953 — $33 million EPT against $11.2 million for plant expansion.

- **Coolant life has been prolonged from four days to seven weeks** in tests using a colloidal dispersion of silver in liquid to inhibit microbe growth in water-soluble coolants.

- **Modified machine that bends stainless tubing** with walls as thin as .0175 in. to tolerance of 0.030-in. in 500 ft is reported to have saved $14,000 per plane at Boeing Seattle. Photo on p143.

- **Cost-cutting is getting increased attention in metalworking firms.** One big Cleveland company has cut its administrative costs down to 7% of gross sales against 9.6% in 1950, gives its salesmen bonuses for meeting expense account budgets, pays workers up to 50% over their base salaries for money-saving production ideas.

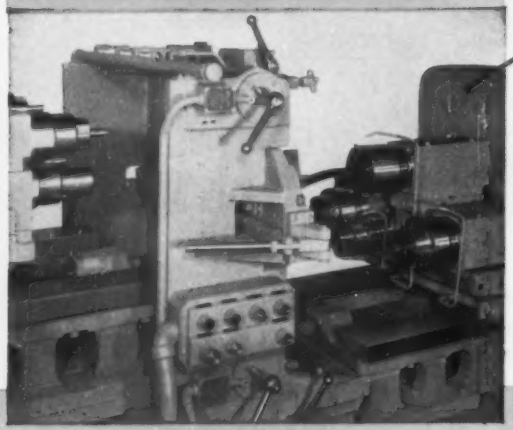
- **Perishable tool business outlook is good.** One large manufacturer reports sales are about the same now as last year, distributor inventories are down 10 to 40%, civilian users are buying well, and sales will be on the upgrade until late fall at least.

- **Lathes that stand on end, millers that also grind,** and millers that operate under water are among unusual machine tools that shape radioactive materials. All are remotely controlled, will be described in the April 12 issue of *American Machinist*.

- **In machining 100-ft parts for the AF Heavy Press Program,** it has been necessary to provide special outboard tables for machines, or to put the machines on rails, or to piggy-back one machine tool on another. Bethlehem Steel has done all three.

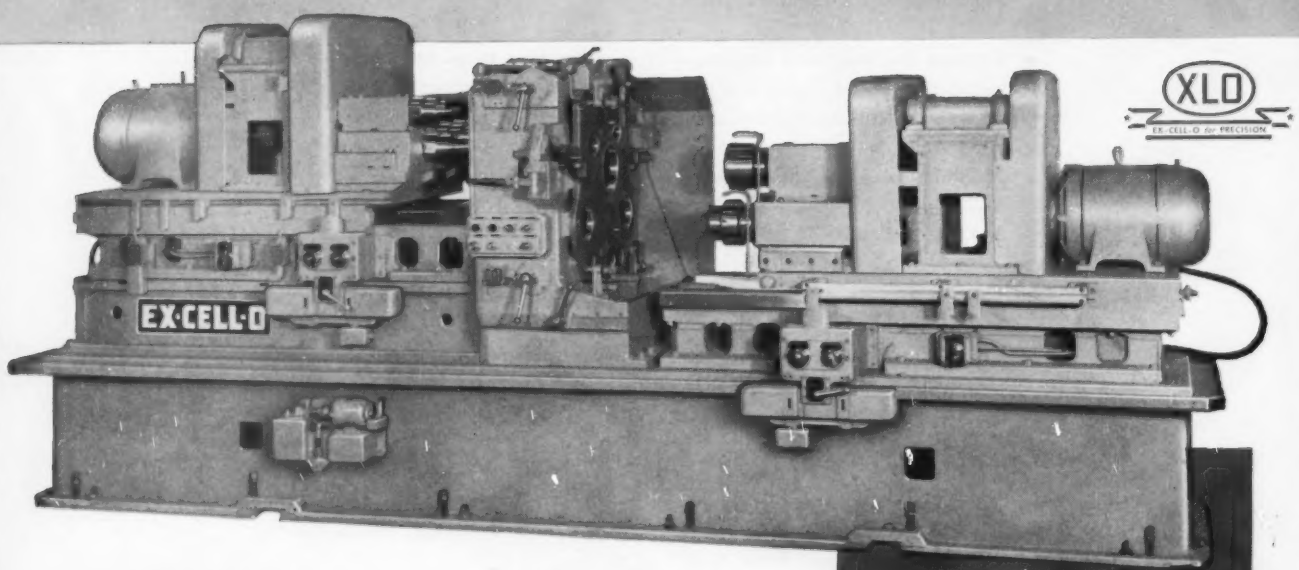
- **New planes mean unusual parts-fabricating problems.** In one case, a 150½-lb forging must be machined to 19.4 lb. It can be made as a precision draftless forging ("pressing") weighing only 20.1 lb and requiring removal of less than 1 lb of chips. Another forging, too big to make on present equipment, is being made from a 4½ x 9-ft plate, 3 in. thick of 75S aluminum. This requires machining a 1500-lb plate down to 150 lb.

Individual spindles are used for each bore to insure accuracy of location.



27 PRECISION OPERATIONS ON 9 HOLES IN ONE CYCLE

Another example of **EX-CELL-O** PRECISION ENGINEERING



SITUATION: The part is a magnesium center plate for a gear box. It's 27½" high and 30½" wide, has holes varying in size from 1⅛" to 6 15/16". Operations are semi-finishing, finish-boring and chamfering 8 holes, and finish-boring, plunge-facing a shoulder and chamfering the 9th hole, which is blind—a total of 27 precision operations.

SOLUTION: The use of this special precision boring machine makes it possible to complete all operations in one cycle, and to hold the required limits. The total tolerance on each of 9 bore diameters is .001", and the location of the bores are held within plus or minus .001".

For suggestions on your precision machining problems, call your Ex-Cell-O representative or contact Ex-Cell-O in Detroit.

Special Ex-Cell-O Precision Boring Machine

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MANUFACTURERS OF PRECISION MACHINE TOOLS • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT.

53-1

Washington . . .

Washington plans still haven't jelled on how to maintain private defense plants—with no government-owned tools—that have little or no civilian use. More than four months ago, ODM set up an inter-agency "Defense Facilities Maintenance Board," which was supposed to do something about this and related mobilization headaches. But so far the board has been unable to accomplish much.

It's snagged on a basic matter. There's no legislative or executive guidance on how to deal with these private plants that have been producing defense goods exclusively—the plants now hit with military cancellations are unable to fall back on civilian work.

One proposal has been to use Vance Plan funds to buy such plants outright with all equipment—at least the ones producing the most strategic goods. (See p 140).

• • •

ODM is rushing work on its long-delayed Mobilization Base Study. That's the project under way for over a year to show up potential gaps in the nation's industrial capacity in case of war. Projected military and essential civilan requirements are being tallied, then translated into raw materials and components. These in turn are being subtracted from known capacity. According to original plans, the study will lead to new government incentives for private expansion in the "gaps" uncovered in the most critical materials—like shell steel.

But this is all theory, of course. Present deadline for the study is June 30. Several earlier target dates have already been missed. At one time, the study was virtually shelved, then later continued with a heavily reduced staff of economists. There's still doubt on what the study will accomplish. When finished it will be submitted to the National Security Council for consideration, its contents top secret because of the detailed requirements data. Considering the climate in Washington—cuts in taxes, defense spending, etc—it's not likely that the mobilization base plans will get off the drafting board.

• • •

Both these projects — facilities maintenance and mobilization base gaps—are under the aegis of ODM's Assistant Director for Production Requirements and Programs. But since ODM's reorganization nine months ago, the administration has been unable to fill the post. It sought an executive from private industry—but definitely not machine tool manufacturing —to take the job. It's Washington's biggest policy post with a direct effect on metalworking.

Now the administration has found its man: George A. Landry, vice president for purchasing and traffic of Western Electric Co. Landry is a former WPB official, will take over the big ODM post in April. During the long interim, William Lawrence, a career civil servant, has been ODM's Acting Director for Production Requirements and Programs. Landry will now have responsibility for leasing idle government-owned machine tools for non-defense production.

• • •

Expansion plans for the Commerce Department's business and Defense Services Administration have been clipped a bit. The House Appropriations Committee approved a $6-million budget for the new agency in fiscal 1955. That's $1.3 million less than BDSA sought, $400,000 less than it received last year. BDSA's Metalworking Equipment Division has been carrying the ball for machine tool builders in their struggle to keep the ban on government tool leases for civilian output.

• • •

The administration's big tax revision bill—including the new provision for faster amortization of plant and equipment—cleared the House by a narrow margin, and went to the Senate with odds favoring passage there.

The pure politics of the situation gave Eisenhower the break that he needed to get the bill through the House without change. Democrats at the last minute made sure they did not muster enough votes to defeat the bill—they figure they are better off if they have the Republican law on the books and thus available as a political issue when the fall elections roll around.

• • •

Real fight is the one that comes when the bill hits the Senate floor—and odds favor "extended debate," although not of filibuster length. Administration leaders were cheered with the way they pulled the tax revision bill through the House.

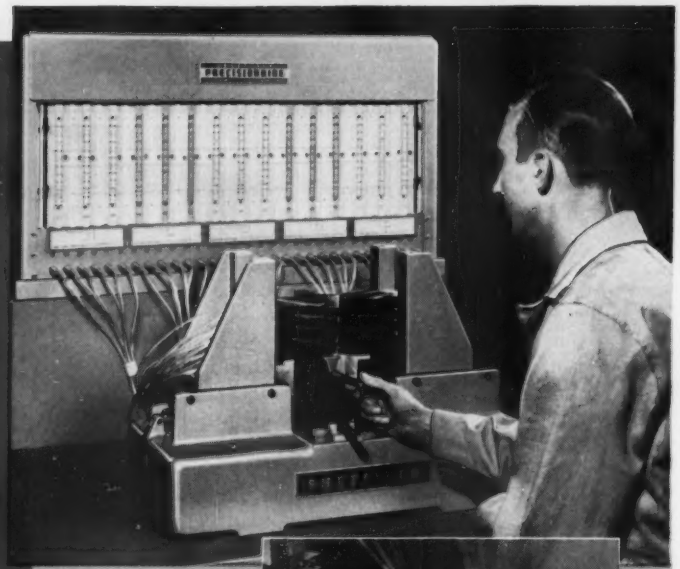
• • •

The bill as it passed the House extends the corporate tax rate at 52% for another year, which thus washes out the scheduled drop to 47% which would have come on April 1.

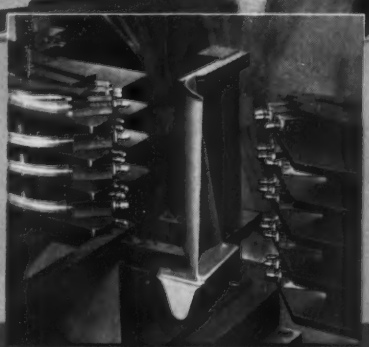
• • •

The overhaul of the whole tax code—including the tax amortization provision—gives about $1.4 billion of tax relief the first year, according to the experts. But the continuation of the 52% income tax rate means that the loss to the treasury the first year will come only to about $200 million.

YOU CAN GAGE 40 or MORE DIMENSIONS *As Quickly* AS YOU CAN ONE



Checking 30 points on a jet engine blade



Gaging heads ready to approach the jet engine blade

Spectacular developments in AIR gaging are saving industry millions of dollars and thousands of man-hours. Here's how and why:

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3. The position of each float shows just where the dimension is within tolerance limits or just how much above or below limit if it is out of tolerance. This is essential for Quality Control.

PHONE, WIRE or WRITE for the full story on how YOU can "produce more and better products at lower cost through practical precision"—in this case, multiple dimension inspection by Precisionaire gaging.

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All main bearings of a tractor crankshaft are checked simultaneously

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MASTER CRAFTSMAN SHEFFIELD HEADQUARTERS

SHEFFIELD

Detroit . . .

Turnabout: auto production standings by company are more fluid than they have been in years.

In mid-March a year ago, the first 10 companies by volume lined up this way: Chevrolet, Ford, Plymouth, Buick, Pontiac, Dodge, Oldsmobile, Mercury, Nash and Chrysler.

This year, according to *Automotive News* compilations, the following switches have occurred:

Ford has nudged Chevrolet off the top; Plymouth has dropped to fifth place, displaced by Buick and Pontiac; Mercury, Olds and Chrysler have rolled over Dodge, dumping it from sixth to ninth; and Studebaker has climbed from 13th to 10th place.

• • •

Production figures, of course, do not necessarily set the sales pattern. A glance at inventory figures —almost 13 cars per dealer industrywide— and at the many new cars on used-car lots around the country suffices to show that most auto assembly plants are outshipping the sales abilities at many dealers. (A recent survey by Studebaker revealed that 80% of salesmen still function only as order-takers.)

Nevertheless, production figures in the beginning of the first truly competitive market in 13 years do tend to point out those makes which have held high rankings simply because productive capacity enabled them to outrun a competitor or two.

• • •

March new-car production is moving at an impressive yearly rate of 6-million units. First-quarter car and truck production combined likely will approach 1.7-million units, compared with 1,862,462 units in the corresponding 1953 period.

• • •

Entry of the Metropolitan to Nash's small-car stable is confounding more than a few onlookers, who are wondering where the US market is for a small—very small—car.

The Metropolitan may answer that, but it won't answer the question Nash asked the public when it showed off the NXI prototype: is there a market for a thousand-dollar car?

The hardtop and convertible Metro models list at $1445 and $1469, respectively, at port of entry. Prices do not include "stove and music." Heaters are $69 extra, radios $60. The Metro thus falls in the range of the Henry J and Nash's own Rambler, and is not much under the least expensive Chevrolets and Fords.

Also, good one-year-old, larger cars are available at approximately the same price. How many potential buyers will be more inclined to put their $1500, more or less, into a larger used cars is one of several unknown factors.

One notable aspect: if the Metro flops, Nash won't suffer huge — by auto standards — losses. Body tooling, plus production of six prototypes, cost a rather niggardly $1-million. No engine tooling cost was incurred, since the Austin engine being installed is a standard production model.

Balance of the developmental work added less than $1 million, so that the entire package reputedly cost under $2 million.

Another factor: Nash is committed to bring in from England only 10,000 of the midgets. That can easily be doubled if demand warrants it, but delivery can be cut off anytime.

• • •

It may be a long time showing up, but a true hardtop convertible is in the advanced development stage at a major auto company.

The retractable roof in this case rolls back, then under the passenger compartment. Large problem: how to design the solid roof to retract without use of a hinge or hinges, which introduce water leakage problems and detract from smooth styling. Engineers report that it can be done, however, without hinges.

• • •

L L Colbert, Chrysler president, is understandably tired of denying merger rumors.

In recent weeks, speculation has had Chrysler buying Reo, Budd, Motor Wheel, Motor Products, Electric Auto-Lite, Mack Truck, others.

Calling all such combinations merely rumors, Colbert said flatly that Chrysler does not plan specifically to use any of its recently acquired $250-million credit to purchase any company.

• • •

Sources outside the company say Ford's Detroit Mound Road Plant will be one of the most thoroughly automated of all Ford's plants when a modernization program is completed later this year.

Mound Road, sister plant of the Canton Forge Plant, manufactures front suspension parts, drive shafts, rear axles, oil pans and transmissions.

• • •

More than $1.5-million worth of Kaiser-owned presses and auxiliary equipment at Willow Run will be transferred to Willys' Shadyside, Ohio, press plant.

The Shadyside plant will be expanded by 22,000 sq ft to accommodate the machinery, which includes 16 presses of 350-ton capacity and over, shears, roller levels, maintenance equipment.

Shadyside's capacity for production of auto stampings will be doubled. When the program is completed this summer, the stamping division and Willys' Toledo press shop will be able to produce all the body stampings required for Kaiser and Willys auto production.

YOU CAN DRILL OR TAP TINY, PRECISION HOLES

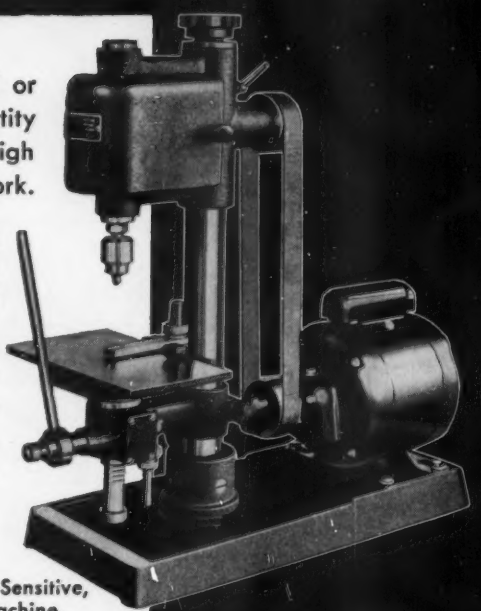
. . . ON A *PRODUCTION* BASIS . . . WITH

MINIMUM SCRAP AND *MINIMUM* TAP AND DRILL BREAKAGE

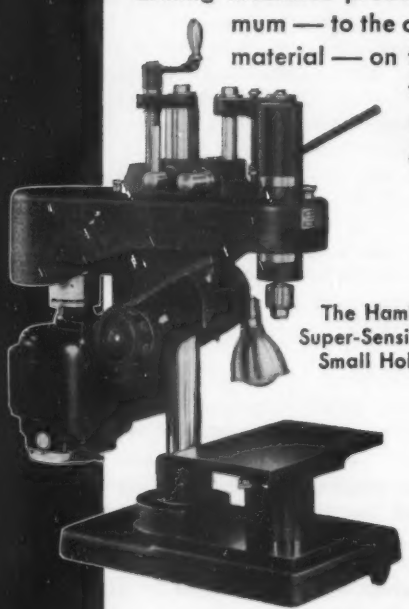
BUT YOU **MUST** FIT THE TOOL TO THE JOB

When your job calls for tiny, precision holes, drilled or tapped, rely on this; such holes can be produced in quantity and within allowed tolerances only on super sensitive, high precision machines designed and built for this class of work.

HAMILTON Drilling Machines and Tapping Machines are super sensitive and extra accurate; designed and built for the production of tiny, precision holes. The drilling machines produce holes up to 0.3125" maximum — to the center of 10" — in any drillable material — on fast production schedules. The tapping machine is designed to use the smallest and finest tap and up to 10-32 inclusive.



The HAMILTON® Super-Sensitive, Small Hole Tapping Machine.



The Hamilton VARIMATIC® Super-Sensitive, Variable Speed, Small Hole Drilling Machine.

Multiple spindles also . . .

Acquaint yourself with Hamilton Super Sensitive, Small Hole Drilling and Tapping Machines and be ready for the challenge ahead. Ask for our FREE Bulletin DT-5308.

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Machine Tools . . .

The Japanese have plans for purchasing more than 10,000 machine tools at a cost of $114 million during the next five years to help modernize their machinery-producing industries.

This plan, which tentatively calls for buying $43 million of machine tools outside Japan, is sponsored by the Japanese Ministry of International Trade and Industry.

Japanese machine tool industry alone will need nearly $15 million of new machine tools, about half of which will be imported.

Japanese Machine Tool Builders' Association is undertaking a three-year modernization program intended to make the country more self-sufficient in machine tool production.

• • •

A subsidy of $341,666 has been granted for new machine tool designs to Japanese builders. Some 21 companies and 25 designs have shared in this largest sponsored by the Japanese Ministry.

Conditions under which a subsidy is allowed are: (1) The type of machine must be one for which a large demand exists in Japan; and (2) a government committee must certify that the builder involved has the competence to make the machine.

When these two conditions are met, the government pays half the cost of research and testing.

• • •

If this development process goes on for two or three years, the builders' association believes that the industry will have capacity to fill almost all of Japan's requirements.

A good part of the government subsidization, it is believed, is going for development of machines which are copies of US and foreign units.

• • •

Japanese builders are said to be working on these types: Copy, tracer, high-speed and multicut lathes; No. 5 and No. 7 highpower millers; precision boring machines; production gear hobbers; jig borers; jig grinders; horizontal boring, drilling and milling machines.

A qualified Japanese technical observer suggests that this list makes sense but contains a few serious errors. The immediate market prospects for some of these machines are limited.

One company — Hitachi Seiki Co Ltd — would like a technical assistance and licensing contract with a US company to make milling machines.

Shoun Machine Works has reached such an agreement for a high-speed lathe with the French firm of Etablissement Cazeneuve.

• • •

Some US builders are reported to have decided that there is little if anything to be gained from a licensing arrangement with Japanese firms.

The Japanese say that if Americans are not interested, other foreigners, especially the Germans, will be.

Germans have their eyes on expanding markets in the underdeveloped countries of Southeast Asia and in Communist China.

"German techniques and managerial know-how," one observer states, "linked up with Japanese labor could provide the highly competitive combination that Japanese management cannot give today."

Germans would expect to build up a valuable business for many years ahead in selling vital machine parts to the Japanese for German-designed tools built in Japan.

• • •

Japanese produced 18,750 so-called "machine tools" last year. Over 10,000 bench-type drilling machines and 645 cylinder reboring tools for automotive repair shops are counted in the total.

Japanese Machine Tool Builders' Association has 52 member companies of which eight produce most of the output.

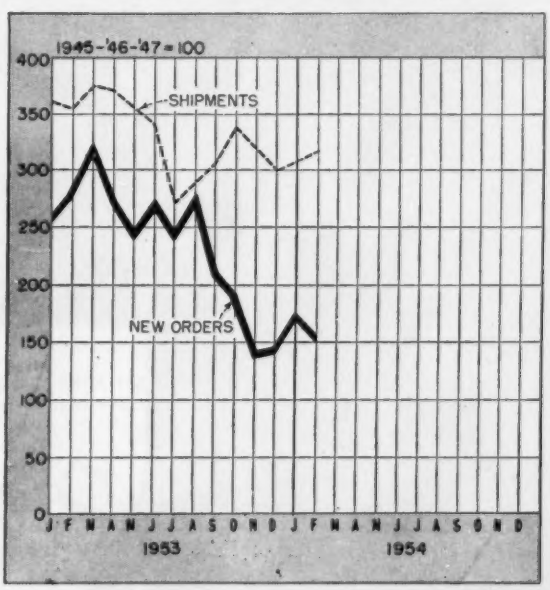
The eight are: Hitachi Seiki, Ikegai Iron Works, Toyoda Machine Works, Nippei Industrial Co, Niigata Engineering Co, Mitsubishi Shipbuilding & Engineering Co, Okuma Machinery Works, and Shibaura Machine Works.

BF

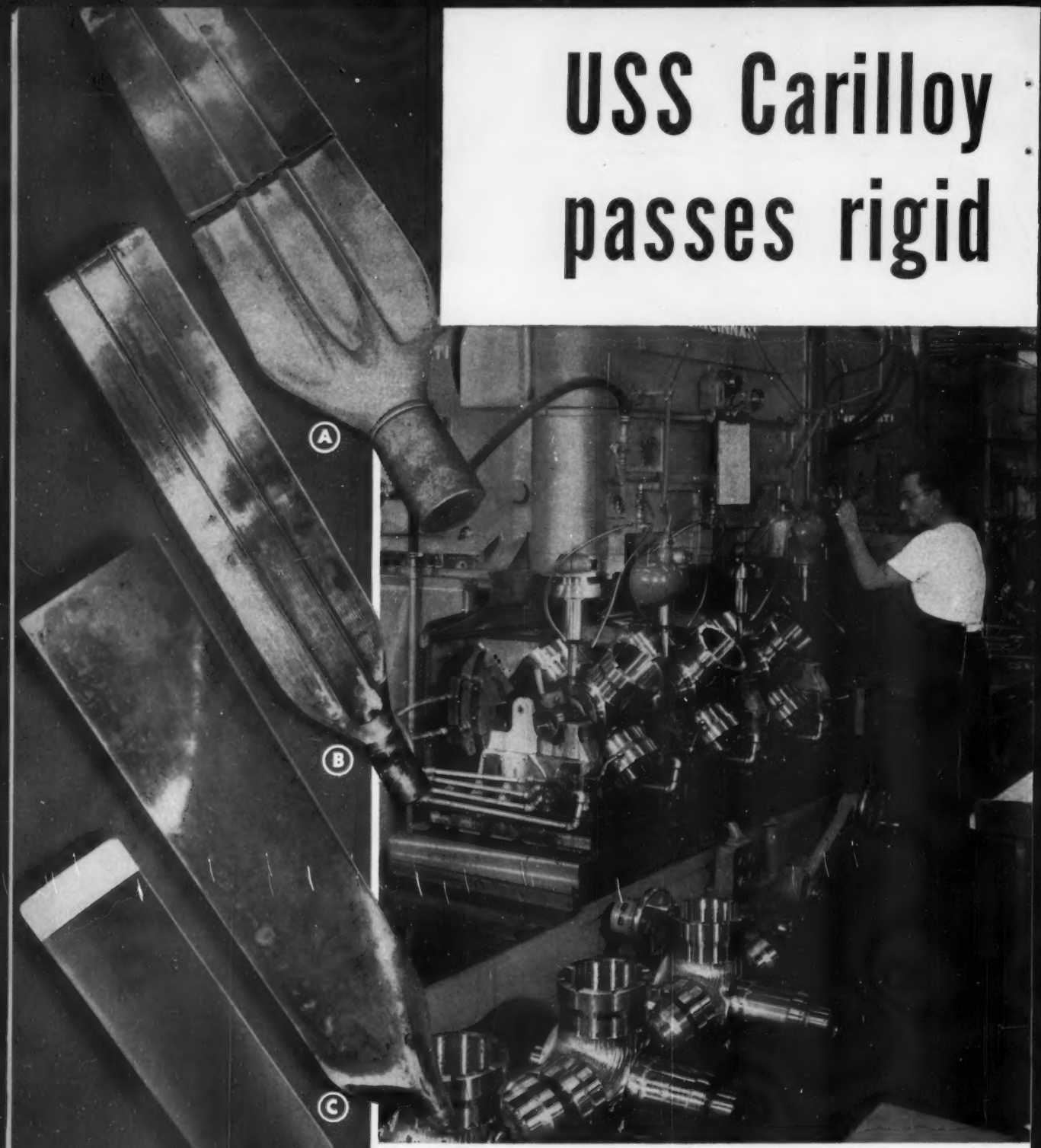
MACHINE TOOL INDEX

(1945-47 = 100)

(Source: National Machine Tool Builders' Assn.)



USS Carilloy passes rigid



THESE HIGH QUALITY aircraft propeller hubs are forged and machined from semi-finished Carilloy 4340. They meet extremely tough magnaflux requirements.

FOR BIG PROPELLERS, 2 forged sections (**a**) are welded together to form one blade thrust member. Pieces are then ground and magnafluxed, Kellered, ground, and magnafluxed again (**b**). Mill camber sheets (**c**) then are copper brazed to the thrust members. Entire unit is heat treated and polished before final magnaflux test and cadmium plating. Rigorous magnaflux testing assures that every finished blade (**d**) can withstand the tremendous stresses encountered on the latest high-speed planes.

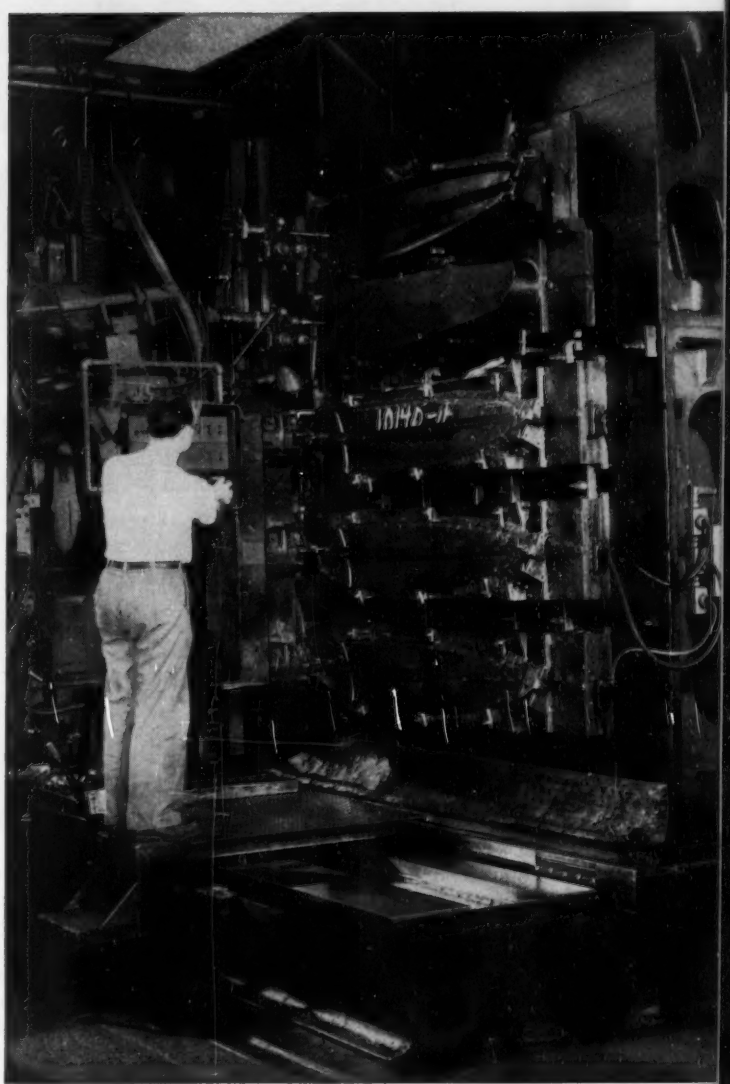
steel tests for propeller blades

An important manufacturer of propellers for military aircraft has found that in stringent magnaflux tests, USS Carilloy steel performs completely satisfactorily.

The high stresses in propeller blades and hubs naturally require extremely high quality steels. Accordingly, the U.S. Army and U.S. Navy have set up rigid quality specifications requiring that every heavily stressed part must be magnafluxed several times during its production.

With USS Carilloy 4340 electric furnace aircraft quality steel, this important manufacturer is able to count on the performance required for this severe application. The consistent high quality of USS Carilloy aircraft steel has meant greater savings to this customer through minimum magnaflux rejections of costly fabricated parts.

USS Carilloy steels have established an enviable record for meeting the highest quality requirements. Therefore, when you need a standard AISI analysis or a special steel for an unusual application, it pays to call in a USS Service Metallurgist. He can help you solve any steel problem.



AFTER FORGING AND MILLING, 750-lb. thrust sections are hogged out on this Kellering Machine. Finished sections weigh about 155 lbs. USS Carilloy steel maintains a No. 1 quality position on these heavy-duty parts.

UNITED STATES STEEL CORPORATION, PITTSBURGH • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. • UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

Carilloy USS Steels

ELECTRIC FURNACE OR OPEN HEARTH

COMPLETE PRODUCTION FACILITIES IN CHICAGO OR PITTSBURGH

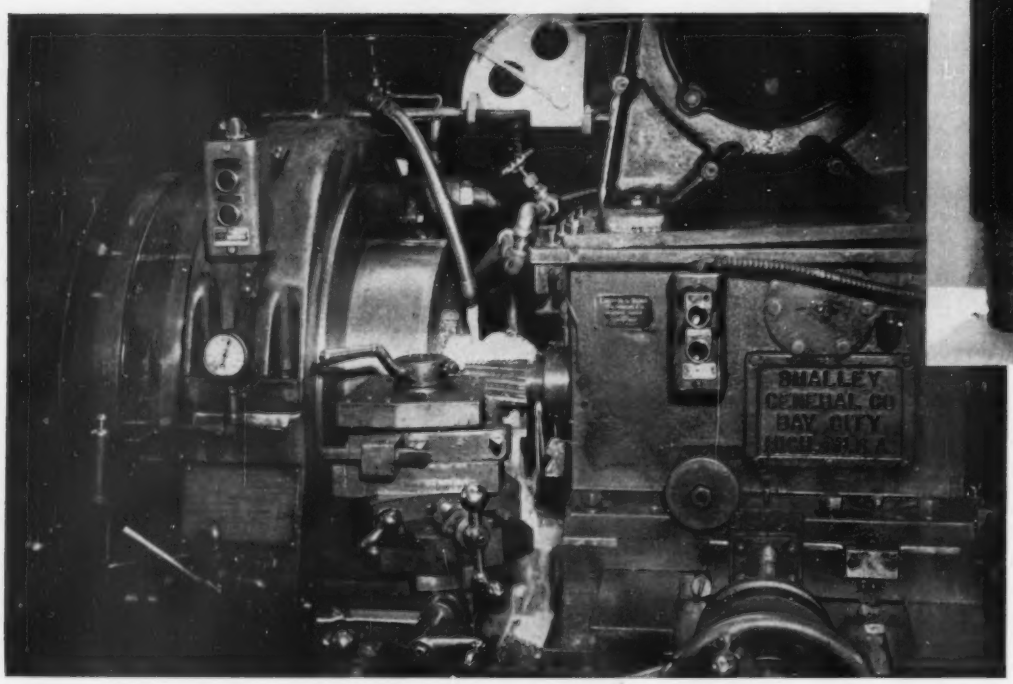
4-665

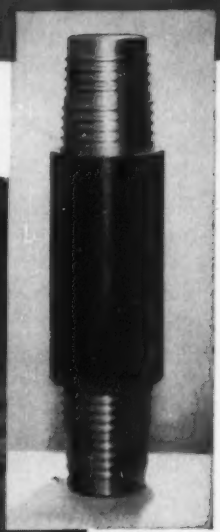
UNITED STATES STEEL

EXCELLENT FINISH AND *NO RUST!*

"Texaco Soluble Oil has saved us thousands of dollars."

— George C. Long, Superintendent
Hydril Company, Rochester, Pennsylvania





ONE of the important steps in making the Hydril Company's patented Twinpin Connectors is the milling of a step thread. The job is done on Smalley General Thread Millers, using a 1:20 emulsion of *Texaco Soluble Oil C.*

"We get excellent finish and tool performance," says Superintendent Long, "but we are most impressed by the rust-preventing ability of *Texaco Soluble Oil.* Our greatest problem was rusting. At one time, circumstances forced us to keep thousands of dollars' worth of finished parts exposed on open pallets for four and a half months in severe humidity. We can thank *Texaco Soluble Oil* for the fact that *we had no single case of rusting or indication of rust on the parts."*

Let a Texaco Lubrication Engineer help you get similar results in your plant. There is a complete line of *Texaco Cutting, Grinding and Soluble Oils* to assure better, faster, lower-cost machining of every kind.

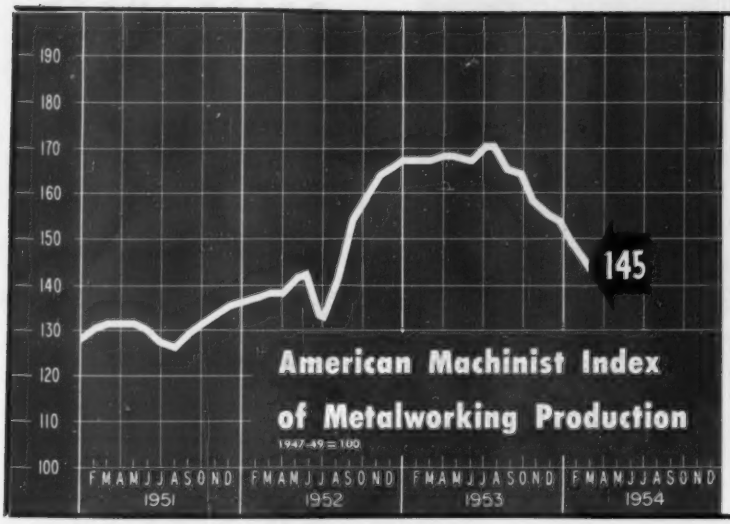
Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO

TEXACO CUTTING, GRINDING AND SOLUBLE OILS FOR FASTER MACHINING

Gaging Metalworking . . .



PRODUCTION INDEX

BASED ON MANHOURS WORKED IN THE FIVE COMPONENTS

	MAR '54(*)	FEB '54(p)	JAN '54(r)	FEB '53
Tot. Index..	**145**	**149**	**154**	**168**
Machinery	**130**	**131**	**145**	
Electrical Machinery	**160**	**168**	**200**	
Autos	**114**	**119**	**130**	
Other Transportation	**290**	**298**	**298**	
Other Metalworking	**126**	**129**	**139**	

(*) Estimated (p) preliminary (r) revised

Metalworking production in the first quarter of 1954 has been just about what was expected.

It disappointed the super-optimists who are not satisfied unless activities stay continuously at an all-time peak.

It was better by far than the dirge-singers had counted on. They fully anticipated that operations would be on a steep toboggan. That has not happened.

• • •

The facts are that output has sloped gently downward without causing undue alarm.

The impressive part of the performance is that the drop-off from the post-Korean high of almost a year ago has not been more than 10%, as measured by *American Machinist's* Index of Metalworking Production.

There is no good reason to expect from here on that the bottom is going to drop out of things.

A seasonal upswing even is possible. Some observers, in fact, think it probable. It will depend in large part on the trend of events in the automobile industry.

Defense and defense-related projects still are the biggest single factor in supporting Metalworking at its present level.

Many defense contracts will be running out as the year goes on. And others will shrink to less volume. But, on the whole, the defense program will lend strong support to Metalworking all year.

That will be especially true in the aircraft and associated industries.

• • •

Manufacturers are well along in their inventory readjustments. Raw materials and work in process are considerably below the level of six months ago. Stocks of finished goods are down too, mostly because companies reduced their output to accomplish this objective.

• • •

Not everything in Metalworking has been pointing downward. There has been a minor boom in small household appliances to which little publicity has been given.

New orders for industrial supplies and machinery have turned upward, according to the index of the American Supply and Machinery Manufacturers' Association.

This reversal of the downward movement in that field suggests an early turnabout in output.

• • •

Here's quick rundown on metalworking around the country: tool and die shipments are running about 94% of December shipments, 88% of January 1953. New orders stayed level.

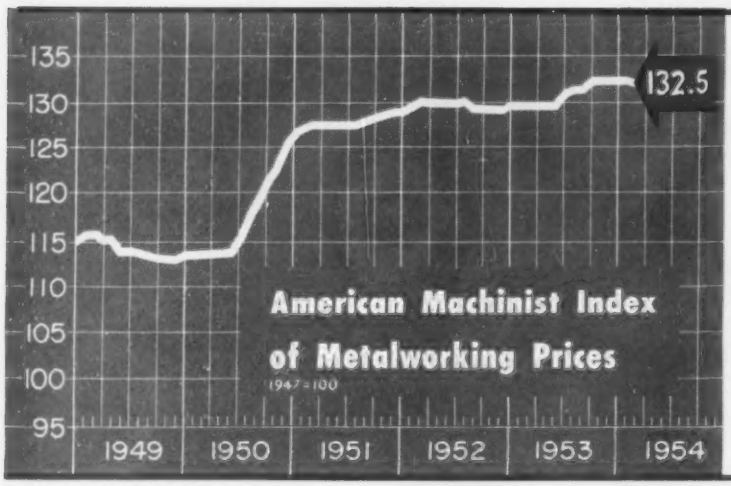
Slight pickup in sales of cutting tools and holders is reported in recent weeks. But sales are running well below same period 1953.

Automotive parts manufacturers in some areas report the auto makers are revising their shipment releases upward.

Severe price competition for industrial fasteners makers is being brought in by low-cost imported bolts, screws and nuts. While volume of imports is small, their low prices coupled with US makers' need for business is putting the squeeze on the industry.

Indication of the steelmakers' outlook: on the average, producers are ordering about 25% less Lake Superior iron ore for 1954 delivery than they did in '53.

Gaging Business . . .



PRICE INDEX

	FEB '54(*)	JAN '54(p)	DEC '53(r)	JAN '53
Total Index	**132.5**	**132.7**	**132.9**	**129.8**
Metalworking Machinery	**142.0**	**141.8**	**137.9**	
Other Machinery exc. Electrical	**137.3**	**137.4**	**132.5**	
Electrical Machinery	**132.0**	**132.0**	**124.6**	
Fabricated Metal Products	**129.1**	**129.3**	**128.3**	

(*) Estimated (p) preliminary (r) revised

Industrial output continues downhill with the February Index (1947-49 = 100) at 123 — about 10% below the 1953 peak.

And March will show a further downslide, it is expected, when all the figures are in. Predicted March figure is around 120.

Non-durable goods output is leveling off, but durables continue to decline.

McGraw-Hill Index of New Orders for Machinery (except electrical) rose 4% in February after leveling off in January.

This could be a good omen for future output. But current new orders levels are still 10% below a year ago.

• • •

Inventories of manufacturers, wholesalers and retailers are estimated at slightly over $80 billion at January's end.

After seasonal adjustment, stocks showed a $300 million decline from December. Part of this decline reflected lower replacement costs.

Manufacturers cut their inventories $300 million, retailers reduced stocks $100 million. But wholesalers added $100 million to theirs.

• • •

3.7 million were unemployed in February, based on a new method of counting the unemployed, and showing an increase of only 600,000 over January's total.

But the old method of counting showed an increase of more than a million unemployed between January and February. Nevertheless, the old method registers only 3.4 million jobless.

• • •

Construction is giving the economy a lift. In the face of declines in industry after industry, construction people piled a new February record on top of their January high.

During the first two months of 1954, expenditures for all construction totalled $4.8 billion.

This was 2% higher than the volume for the first two months of 1953.

WEEKLY BUSINESS INDICATORS

	Latest Week	Preceding Week	Year Ago
Business Week Index of Activity (1947-1949 = 100)*	119.8	120.2	133.6
Steel ingot operation (thousands of tons)	1,616	1,652	2,288
Electric power output (million Kilowatt hours)	8,519	8,586	8,138
Production of automobiles and trucks	142,468	139,263	165,762
Engineering construction awards (*Eng. News-Record*—millions)	$215.4	$245.5	$316.1

MONTHLY BUSINESS INDICATORS

	Latest Month	Preceding Month	Year Ago
Index of industrial production (1947-1949 = 100)*	123	125	134
Index of durable manufactures production (1947-49 = 100)*	137	140	155
Durable goods manufacturers' sales, millions*	11,441	11,576	12,508
Electrical machinery manufacturers' sales, millions*	1,317	1,349	1,337
Other machinery manufacturers' sales, millions*	1,966	1,902	2,138
Durable goods manufacturers' new orders, millions	8,002	9,567	12,454
Electrical machinery manufacturers' new orders, millions	973	949	1,521
General machinery manufacturers' new orders, millions	1,264	1,613	1,829

* Seasonally adjusted

✓SAVE UP TO 40% SPACE!

✓EXTRA HIGH SAFETY FACTOR!

✓DEPENDABILITY . . . backed by 38 Years of Know-How!

CIRCULAR HEADS WITH TIE RODS
SQUARE HEADS WITH TIE RODS
T-J
T-J
T-J
SPACE SAVED
T-J SPACEMAKER . . . provides additional room for adjacent equipment without sacrificing strength.

Off shelf delivery all styles to 3" bore in increments of 1" to 12" stroke.

NEW (T-J)

Spacemaker

AIR CYLINDERS

Streamlined design of the new T-J Spacemaker *eliminates tie rods . . . saves up to 40% in mounting space!* It's performance-proved . . . *super rugged* with extra high safety factor . . . solid steel heads . . . heavy wall, precision honed, *hard chrome plated,* seamless steel body . . . leakproof cylinder head to body construction . . . heavy duty, hi-tensile, *hard chrome plated* piston rod.

Available with the new T-J Super Cushion Flexible Seals which insure positive cushion with automatic valve action for fast return stroke. Many standard sizes and styles . . . for pushing, pulling, lifting, clamping or control jobs. T-J dependability. Write for bulletin 454. The Tomkins-Johnson Co., Jackson, Mich.

(T-J) TOMKINS-JOHNSON

RIVETORS AIR AND HYDRAULIC CYLINDERS CUTTERS CLINCHORS

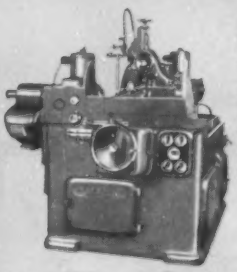
SHEFFIELD MACHINE TOOLS

guard *PRECISION* in the shop

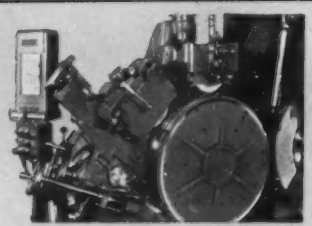
Micro-form Grinder, Model 121 grinds high precision profiles both flat and circular directly from large scale drawing, saving up to 75% over conventional practice.

Micro-form Grinder, Model 122 equipped with a combination 30 power microscope and viewing screen.

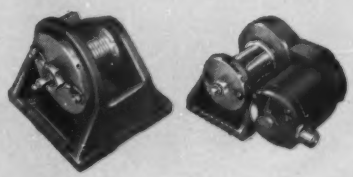
Thread and Form Grinder, Model 133 uses the multi-ribbed wheel principle to grind small precision threads and intricate forms on a high production basis.



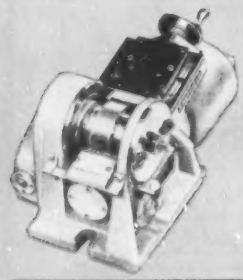
Precision Thread and Form Grinders —100 Series, produce precision threaded elements and cylindrical forms by the Crushtrue method, the diamond dressed multi-ribbed wheel or the single point wheel method.



Special machine tools are a Sheffield specialty, such as this one of 12 jet turbine shroud grinders placed in operation within the last six months.

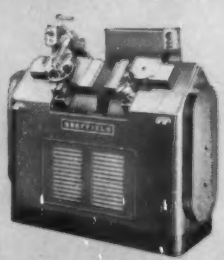


Idler and motorized type Crushtrue devices are available for forming grinding wheels on standard surface grinders.



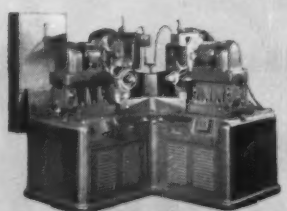
Self-truing Motorized Crushtrue Device forms surface grinder wheels for the grinding of flat form tools, etc. of the highest precision and uniformity.

The Sheffield Crushtrue Roll Bank plan provides Rolls for production use while worn rolls are enroute to Sheffield for re-grinding and re-ground rolls are enroute from Sheffield for use. Nominal exchange charge.



Gear and Spline De-burizers deburr or chamfer up to 600 gear teeth per minute. Applicable to spur, helical, hypoid, bevel and herringbone gears —also multi-start worms.

Gear and Spline Chamfering Machines chamfer, burr or recess the ends of gear teeth at high production rates—ideal for short runs and quick changeover.



Style "C" Gear and Spline Chamfering machines have two cutter spindles and two workheads for mass production gear manufacture.

Sheffield is prepared to produce precision threaded elements and formed parts on contract to augment your own manufacturing facilities.

CHECK THE BOX ☑ for any piece of equipment or service in which you are interested. Tear this out, attach it to your letterhead, mail to Sheffield, and detailed engineering data will be forwarded.

Machine Tool Division • The Sheffield Corporation
Dayton 1, Ohio, U. S. A.

MASTER CRAFTSMAN SHEFFIELD HEADQUARTERS

SHEFFIELD

6559

American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

What The 50-Plus Club Offers

"WANTED— Salesman between 50 and 65 years of age." Sounds startling? Maybe so, but this advertisement actually appeared in a magazine recently. It was not a gag, either. The company inserting it was strictly in earnest.

It was looking for a salesman long enough in the business of selling to have had plenty of experience and mature judgment upon which to draw in the competitive days ahead.

But the company had in mind something even more specific than that. It wanted a man whose selling life encompassed more than the easy years since 1939, during which order-taking has been pretty much the rule, who had operated in the 1930's when sometimes getting even a modest order was a just cause for celebration.

This deliberate search for an older man rather than a young one focuses attention on the potential that the older man offers to industry today.

His is not a case of standing with a tincup asking for alms or selling apples. He can bring to a job certain valuable assets that the younger man often cannot muster.

He needs little if any training. He is ready without delay to move importantly toward the company's objective. He is resourceful in the face of setbacks. He doesn't watch the clock. He is likely to be reliable and disinclined to move from job to job.

He admittedly does not have the potential for future years that the young man has. But for the immediate present, and for a limited period ahead, he may be just what the doctor ordered.

What applies to older salesmen applies to older men through your metalworking business. It goes for engineers, superintendents, shop men and researchers, to name only a few.

Mind you, we have no quarrel with young men. In fact, we like them and know how indispensable they are to a successful business. In many respects, this is a young man's age. Just to pinpoint the matter, the top managements of some companies in the electronics field, which is a new and fast-changing industry, are made up of men in their thirties.

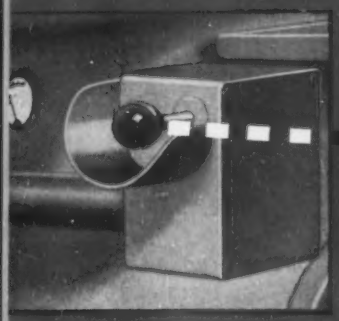
More young men are in responsible positions in Metalworking today than ever before. They bring to management many assets — physical vigor, a fresh approach, few if any inhibitions, a minimum of prejudices, schooling in the latest engineering and scientific developments and theories, a driving ambition to succeed.

These are all wonderful assets to them and to you. But along with these men of younger years you can well afford to have, for your own sake, a liberal sprinkling of "old hands" who have been through many crises and who, partly because of long experience, can cope with the hottest competitive situation resourcefully.

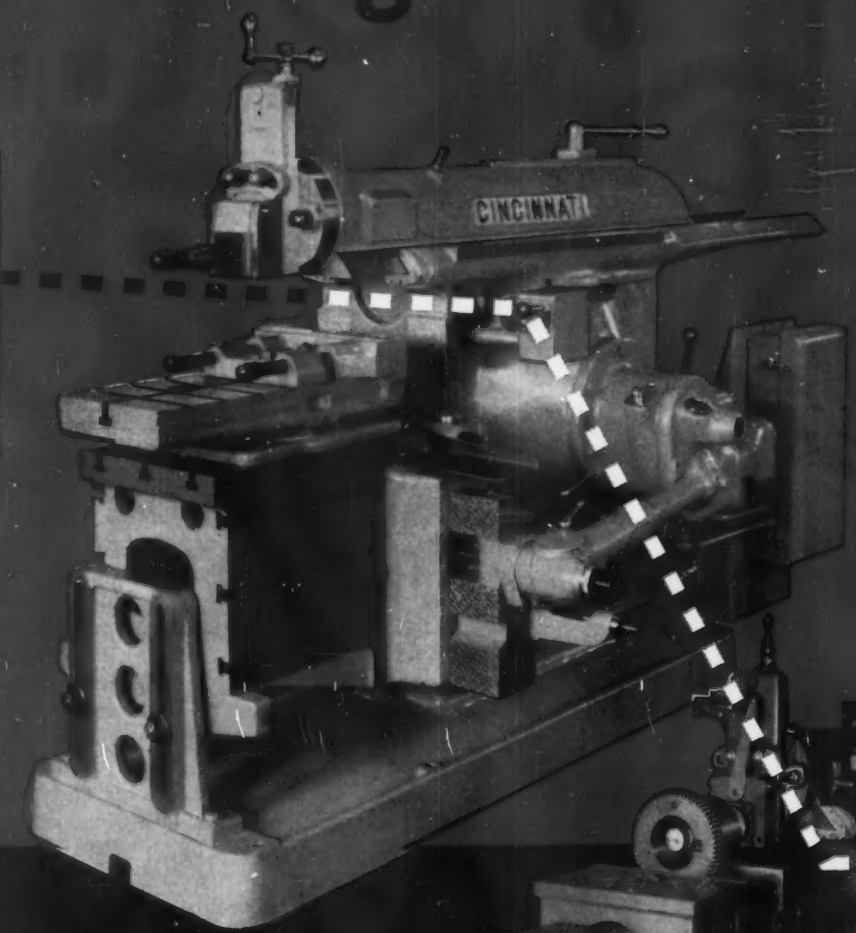
That is why the company that set out to get a salesman 50 to 65 years of age seemed to us to be acting in a perfectly rational and shrewd manner.

Burnham Finney

Outstanding Time Saver...
...Outstanding ACCURACY



Single Control Lever



The New Cincinnati Magnetic Clutch and Brake, with its single, convenient control lever, gives the operator the fastest, simplest and most accurate control of his Shaper and converts waste time into productive time.

This powerful clutch and brake requires no adjustment, and has a long, maintenance-free life.

Write for Cincinnati Shaper Catalog N-5.

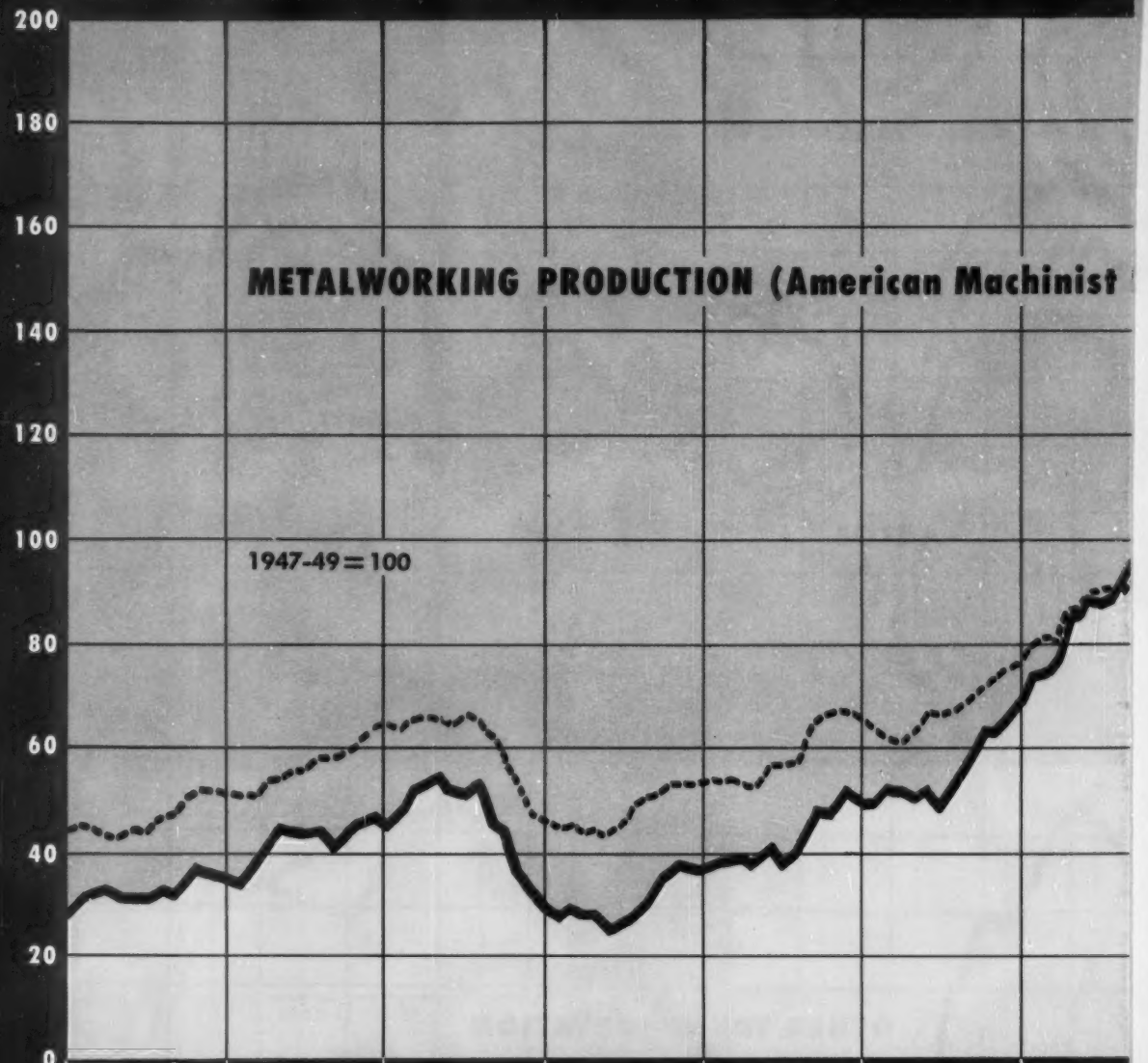
30% Time Saving

Shaping time on 7 internal oil grooves in these steel sleeves was reduced from 12.5 minutes to 8 minutes, by the Cincinnati Electro-Magnetic Clutch and Brake.

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

American Machinist Index of Metalwor



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FEB	30.8	FEB	33.7	FEB	47.5	FEB	27.1	FEB	38.3	FEB	49.6	FEB	7
MAR	32.1	MAR	37.5	MAR	50.8	MAR	27.9	MAR	39.2	MAR	50.4	MAR	7
APR	32.5	APR	42.1	APR	53.3	APR	27.5	APR	39.6	APR	50.4	APR	7
MAY	30.8	MAY	44.1	MAY	54.6	MAY	27.1	MAY	38.7	MAY	50.0	MAY	8
JUN	30.4	JUN	43.7	JUN	50.4	JUN	25.4	JUN	40.0	JUN	50.4	JUN	8
JUL	30.0	JUL	42.5	JUL	50.0	JUL	26.7	JUL	37.5	JUL	48.3	JUL	8
AUG	31.2	AUG	42.1	AUG	50.8	AUG	28.3	AUG	39.6	AUG	52.1	AUG	8
SEP	30.8	SEP	40.4	SEP	45.0	SEP	30.0	SEP	43.7	SEP	57.9	SEP	9
OCT	34.6	OCT	43.7	OCT	43.7	OCT	34.6	OCT	47.9	OCT	62.5	OCT	9
NOV	37.1	NOV	46.6	NOV	36.7	NOV	37.9	NOV	47.9	NOV	63.7	NOV	9
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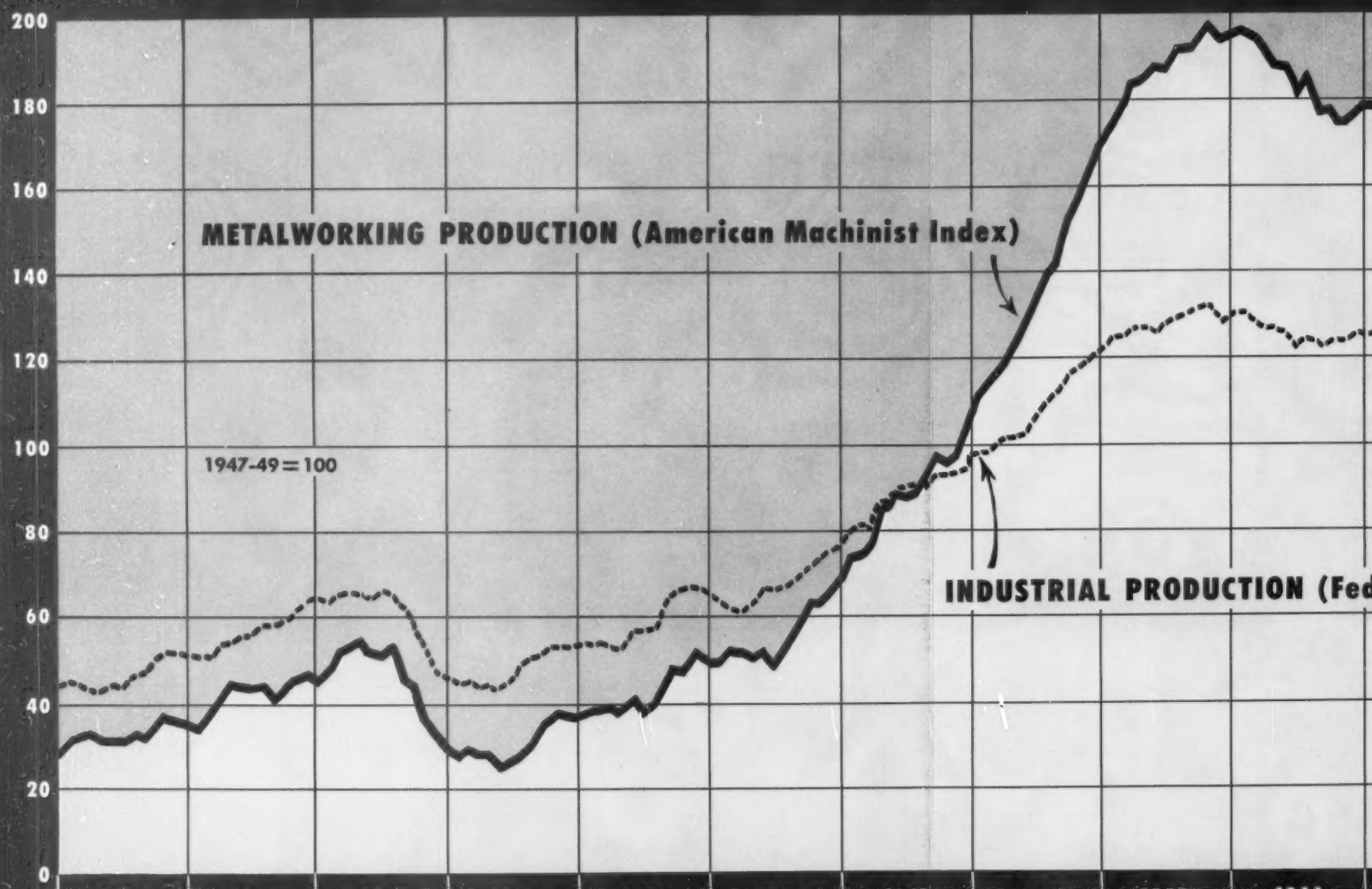
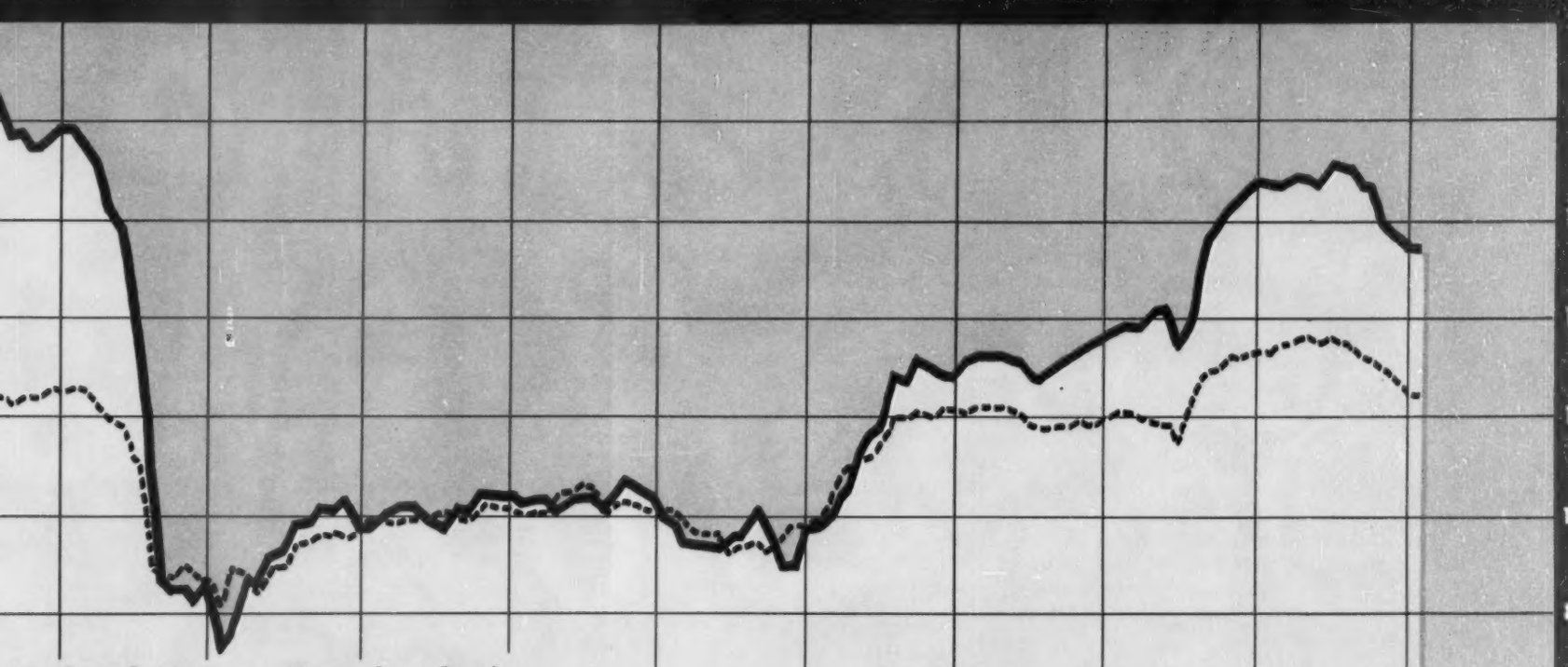
American Machinist Index of Metalworking Production shi



1935		1936		1937		1938		1939		1940		1941		1942		1943		1944	
JAN	27.5	JAN	34.2	JAN	45.8	JAN	27.1	JAN	37.1	JAN	48.7	JAN	68.7	JAN	106.6	JAN	169.9	JAN	195.8
FEB	30.8	FEB	33.7	FEB	47.5	FEB	27.1	FEB	38.3	FEB	49.6	FEB	73.3	FEB	110.3	FEB	174.9	FEB	196.6
MAR	32.1	MAR	37.5	MAR	50.8	MAR	27.9	MAR	39.2	MAR	50.4	MAR	76.6	MAR	115.0	MAR	179.5	MAR	194.5
APR	32.5	APR	42.1	APR	53.3	APR	27.5	APR	39.6	APR	50.4	APR	77.9	APR	119.1	APR	183.7	APR	191.2
MAY	30.8	MAY	44.1	MAY	54.6	MAY	27.1	MAY	38.7	MAY	50.0	MAY	84.1	MAY	123.3	MAY	185.8	MAY	188.3
JUN	30.4	JUN	43.7	JUN	50.4	JUN	25.4	JUN	40.0	JUN	50.4	JUN	88.3	JUN	128.3	JUN	188.7	JUN	187.4
JUL	30.0	JUL	42.5	JUL	50.0	JUL	26.7	JUL	37.5	JUL	48.3	JUL	87.0	JUL	132.9	JUL	188.3	JUL	180.8
AUG	31.2	AUG	42.1	AUG	50.8	AUG	28.3	AUG	39.6	AUG	52.1	AUG	88.7	AUG	139.9	AUG	191.6	AUG	186.6
SEP	30.8	SEP	40.4	SEP	45.0	SEP	30.0	SEP	43.7	SEP	57.9	SEP	92.9	SEP	142.4	SEP	192.4	SEP	177.0
OCT	34.6	OCT	43.7	OCT	43.7	OCT	34.6	OCT	47.9	OCT	62.5	OCT	97.0	OCT	151.6	OCT	193.3	OCT	178.3
NOV	37.1	NOV	46.6	NOV	36.7	NOV	37.9	NOV	47.9	NOV	63.7	NOV	95.8	NOV	157.4	NOV	199.1	NOV	174.9
DEC	36.7	DEC	47.5	DEC	30.4	DEC	37.1	DEC	50.4	DEC	66.6	DEC	98.7	DEC	163.3	DEC	194.1	DEC	177.4

shifted to 1947-49 base for easy comparison



(Federal Reserve Board Index)

4	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954
95.8	JAN 179.9	JAN 85.0	JAN 97	JAN 104	JAN 101	JAN 97	JAN 129	JAN 137	JAN 168	JAN 155
96.6	FEB 179.5	FEB 71.6	FEB 98	FEB 103	FEB 99	FEB 97	FEB 131	FEB 138	FEB 168	FEB 154 est
94.5	MAR 175.8	MAR 77.1	MAR 100	MAR 103	MAR 97	MAR 99	MAR 132	MAR 139	MAR 168	
91.2	APR 170.8	APR 87.9	APR 102	APR 103	APR 95	APR 104	APR 132	APR 139	APR 169	
88.3	MAY 160.3	MAY 88.3	MAY 102	MAY 102	MAY 94	MAY 111	MAY 132	MAY 142	MAY 169	
87.4	JUN 155.4	JUN 91.2	JUN 101	JUN 103	JUN 94	JUN 117	JUN 131	JUN 143	JUN 168	
80.8	JUL 145.8	JUL 92.9	JUL 98	JUL 104	JUL 95	JUL 119	JUL 128	JUL 134	JUL 171	
86.6	AUG 124.1	AUG 97.5	AUG 97	AUG 104	AUG 96	AUG 129	AUG 127	AUG 142	AUG 171	
77.0	SEP 86.6	SEP 99.1	SEP 101	SEP 103	SEP 99	SEP 128	SEP 130	SEP 154	SEP 166	
78.3	OCT 86.2	OCT 100.8	OCT 102	OCT 106	OCT 96	OCT 132	OCT 132	OCT 159	OCT 165	
74.9	NOV 85.0	NOV 100.8	NOV 104	NOV 105	NOV 90	NOV 130	NOV 134	NOV 164	NOV 159	
77.4	DEC 82.5	DEC 103.7	DEC 104	DEC 103	DEC 90	DEC 129	DEC 136	DEC 166	DEC 156	

groups comprising AM Index of Metalworking shifted to

With this issue, *American Machinist* is revising its Index of Metalworking Production onto a postwar basis. Up to now it has been on a prewar (1939) base. The new index, which will take the years 1947-1949 as 100, will simplify comparison with the new Federal Reserve Index of Industrial Production. The FRB Index, formerly using 1935-1939 as a base, has recently been put on a 1947-1949 base.

It is true that the years 1947-1949 do not represent a truly normal period (but what period is normal?). Nevertheless that three-year spread is typical of industrial activities in the postwar period. It covers two relatively good years and one bad year (1949).

The new *American Machinist* Index, like the old one, is made up of five major components: machinery; electrical machinery; automobiles, trucks and parts; other transportation equipment (including aircraft); and other metalworking. It uses current weighting and seasonal adjustment factors for each industry group. Actually, relative weights are based on value-added-to-production data as reported by the Bureau of the Census for all manufacturing industries. Here are the relative weights:

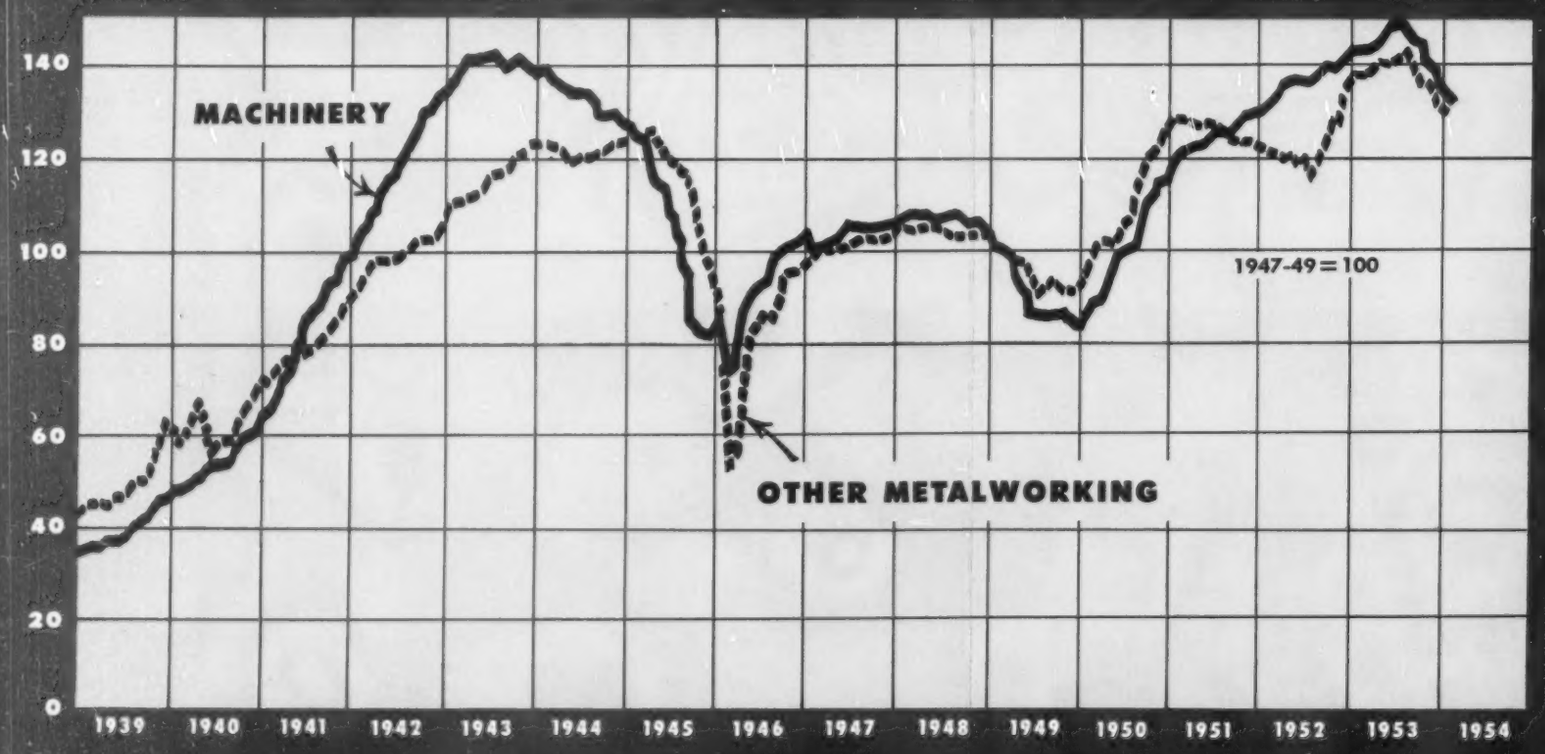
Machinery	31.69
Electrical Machinery	16.27
Autos, Trucks and Parts	16.83
Other Transportation Equipment	9.61
Other Metalworking	25.60
	100.00

These weights apply only since 1947. Prior to January of that year, the indexes were self-weighted by manhours (adjusted for productivity of each group). Thus if manhours increased in the auto industry in any month, its importance in that month would increase proportionately to total manhours.

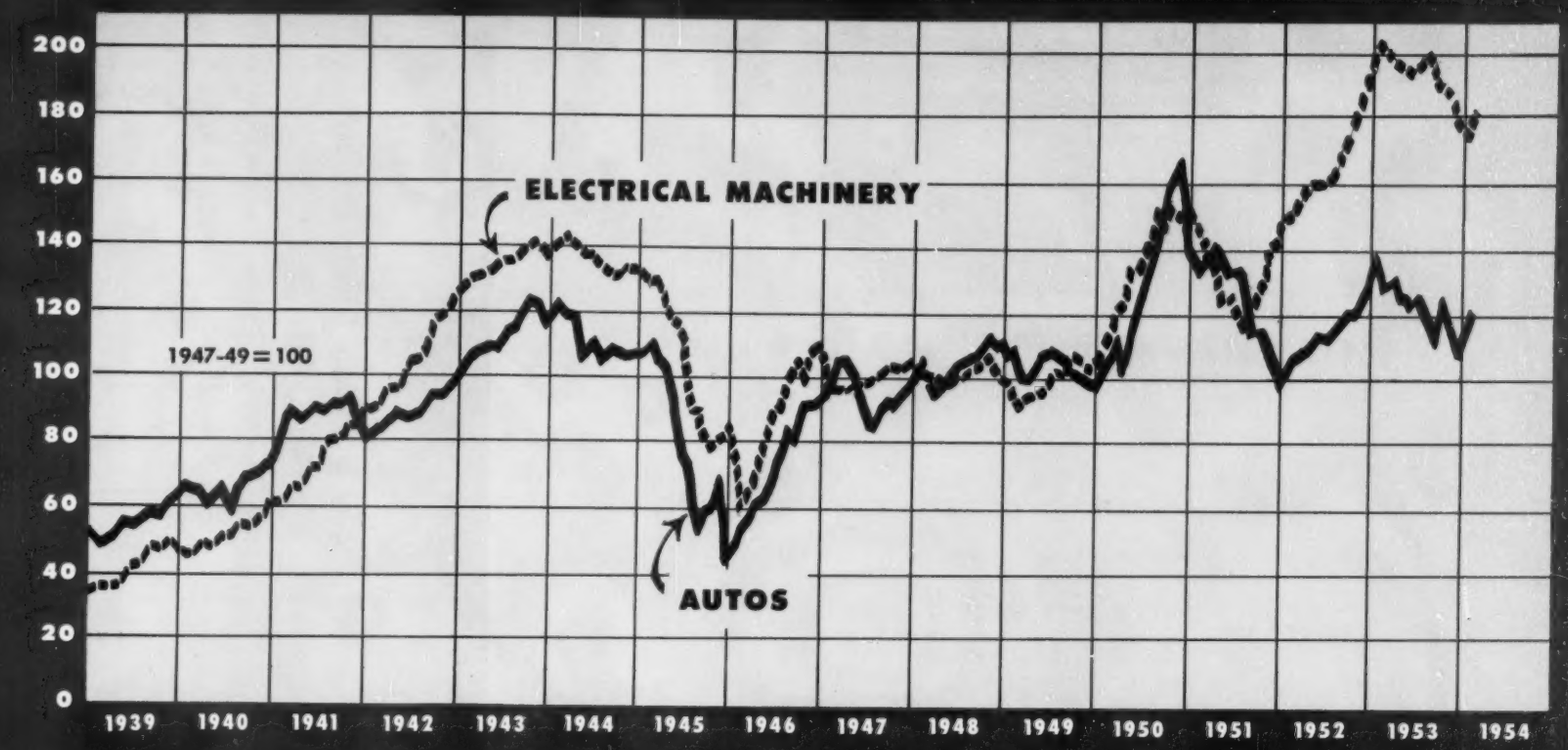
Seasonal variations, such as those related to social customs, holidays, and weather conditions, are removed so any month may be compared with any other.

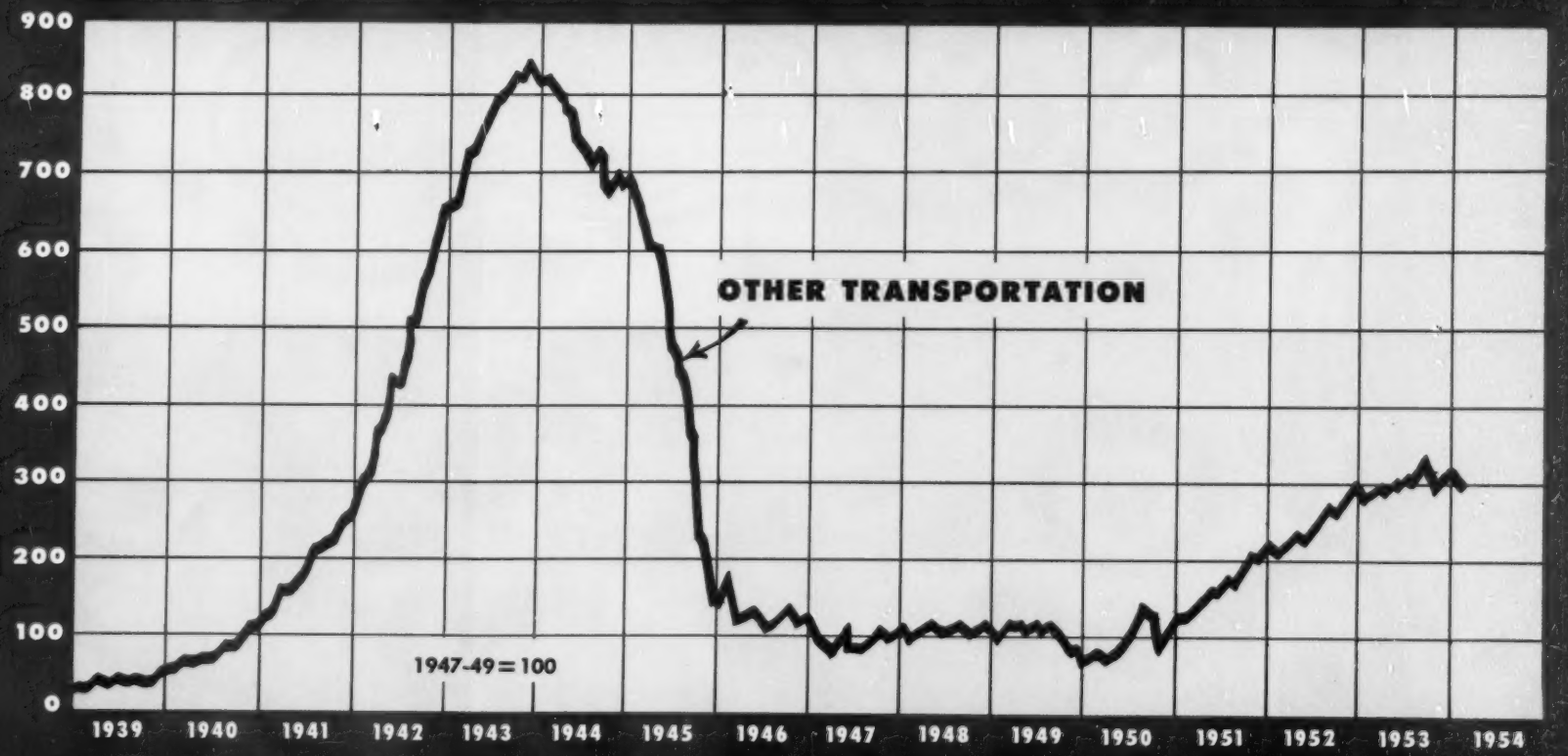
The *American Machinist* total Metalworking Index is available back to 1935. The former Index was converted to 1947-49 base, then linked to the new index beginning with January 1947. Various group indexes are available starting with January 1939, and were similarly shifted in base. However, prior to 1947, there were no good figures available on manhours or physical production of fabricated metal products or instruments. So for this period the trend of output of iron and steel products is used to measure production in the "Other Metalworking" group.

If any reader wants a metalworking index based on a time span other than 1947-1949=100, he can easily convert our indexes to any other base month, year, or span of years he chooses. To do this, he simply selects his new base period, then divides each of our index numbers by our index number for the base period he has chosen, and multiplies by 100. If, for instance, he chooses January, 1950, as his base period, he divides all our indexes by 97, the index number for January, 1950. The new set of figures measures fluctuations in metalworking production from January, 1950, instead of from 1947-1949.



l to new base


200
180
160
140
120
100
80
60
40
20
0
ELECTRICAL MACHINERY
1947-49 = 100
AUTOS
1939
1940
1941
1942
1943
1944
1945
1946
1947
1948
1949
1950
1951
1952
1953
1954


900
800
700
600
500
400
300
200
100
0
OTHER TRANSPORTATION
1947-49 = 100
1939
1940
1941
1942
1943
1944
1945
1946
1947
1948
1949
1950
1951
1952
1953
1954

groups comprising AM Index of

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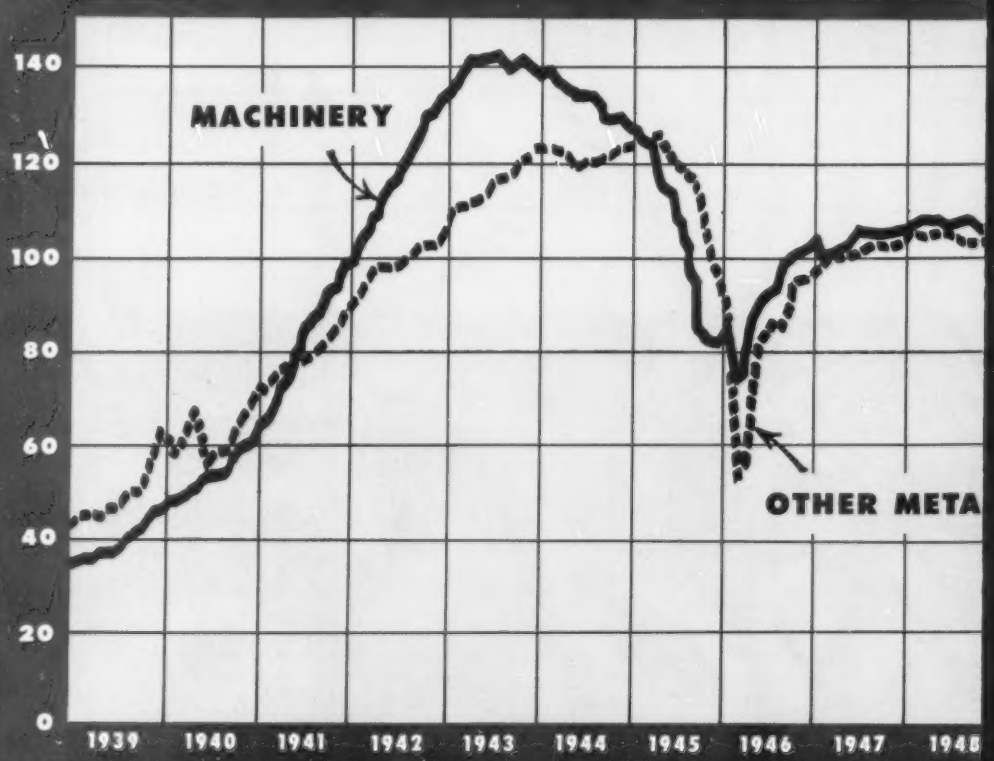
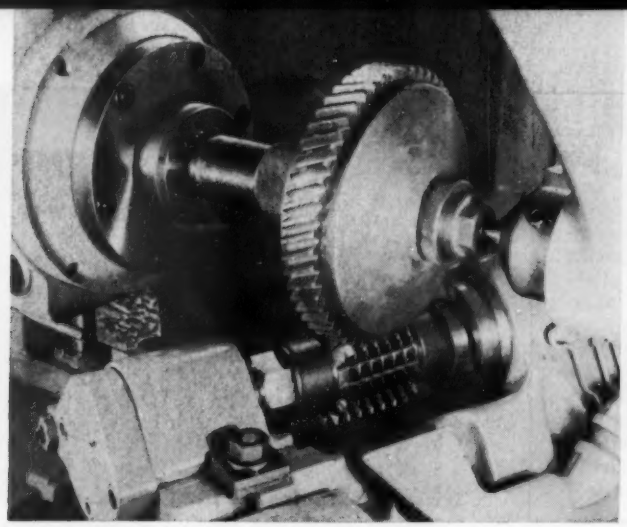
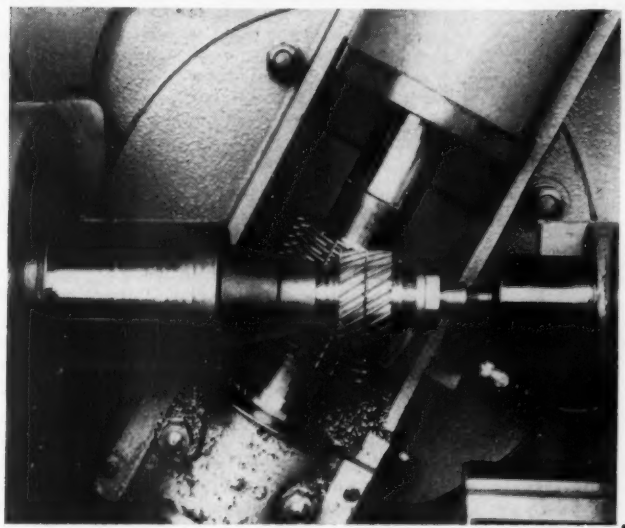


American Machinist





Gear-cutting savvy

in 16 easy steps

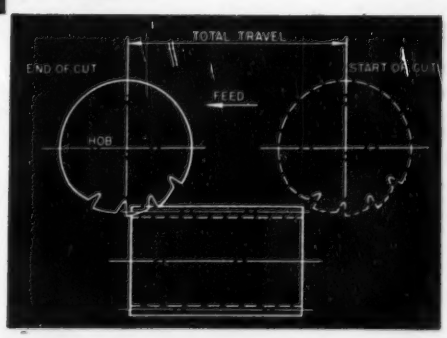
RICHARD S HILDRETH, field engineer,
MICHIGAN TOOL COMPANY, DETROIT

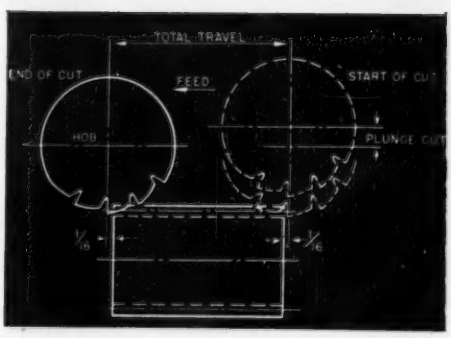
Gear cutting is a subject which many production men shy away from, because by tradition it has been cloaked with secrecy like a problem child. Their attempts to acquire a basic knowledge of gear cutting bogs down because reading time among production people is at a premium. . . . The gist of this article is a quick, clear-cut introduction to the various gear-cutting processes

CONVENTIONAL HOBBING MACHINE for spurs, helicals, and splines can also successfully generate multiple-thread worms by using a special 90° hob swivel and restricting the worm to three or more threads. Two thread worms or less require speed on the index worm in excess of a safe speed

HIGH-SPEED HOBBING MACHINE built specifically for high production requirements, with hob spindle speeds up to 1000 rpm, cuts two gears back-to-back in 58 sec. High spindle speed was brought about when HSS hob life was discovered to be satisfactory at higher surface speeds. This machine has a set of index, or ratio, gears at the rear. Speed-change gears, housed in same compartment, seldom need be changed. Infinitely variable hydraulic feed eliminates feed-change gears, desirable on high-production units

REQUIREMENTS OF HOB TRAVEL to hob face width of a gear to full depth may be restricted by the proximity of adjacent shoulders. Three sets of gears are required in the standard, non-differential hobbing machine. ***Index gears*** control number of teeth to be hobbed in gear. ***Feed gears*** control advance of hob during one revolution of work spindle. ***Speed-change gears*** control hob speed and can be altered without affecting index or feed, other than to increase or decrease them proportionately. However, when hobbing helical gears, index and feed gears must be timed accurately to obtain lead on the gear

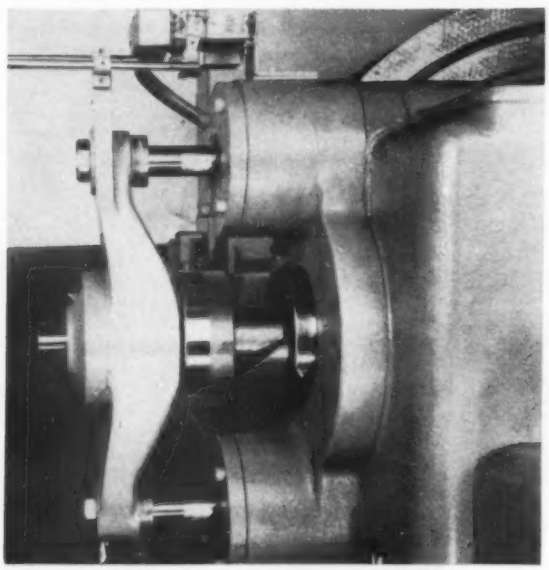




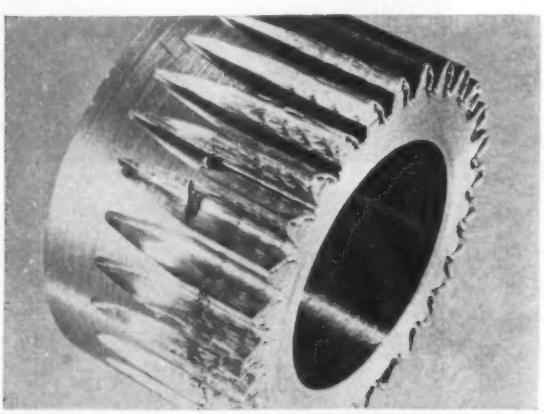
TOTAL TRAVEL OF HOB on the high-speed model is reduced by all but 1/16 in. of approach feed by means of a plunge feed of hob to correct depth. Hydraulic traverse feed moves work past hob to completion of cut

Building accuracy into gears...

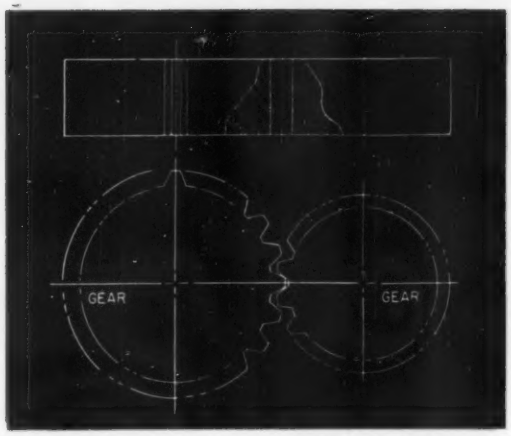
Hobbed gears are usually required to be accurate to tenths of thousandths, in terms of spacing tooth to tooth, lead of tooth, profile, and pitch-line concentricity. The required degree of accuracy cannot be achieved unless accuracy itself is built into the gear blank. Faces of gear blank must be parallel to each other and square to ID, and OD must be concentric to ID. In addition, it is desirable that material being cut is consistent metallurgically. The machine itself, its arbors, spacers, and over-all operation, must be maintained in excellent running condition.



HELICAL OR STRAIGHT CAM GUIDE mounted directly to work spindle eliminates the need for timed relation between index and feed gears that exists on conventional hobbers. Use of a guide is an approved practical means of controlling lead uniformity on high-production runs



HIGH FEED RATES show generating marks or scallops of uniform depth on gear flanks. Although visible to the eye, depth of scallops is actually only a few tenths of a thousandth deep. If desired, finer feed eliminates scallops. Gears with or without scallops will shave equally well, hence hobbed gears with scallops should be shaved



DEFINING GENERATING SHAPING METHOD is simple if you consider two gears rolling in conjugate mesh on fixed centers. One of these is gear to be cut, the other is to become the shaper cutter. To achieve cutting action, reciprocation of one member is required, usually the shaper cutter. Reciprocation taking place along axis of shaper cutter does not have any effect on rolling of the two members. However, rolling action must be maintained in timed relationship

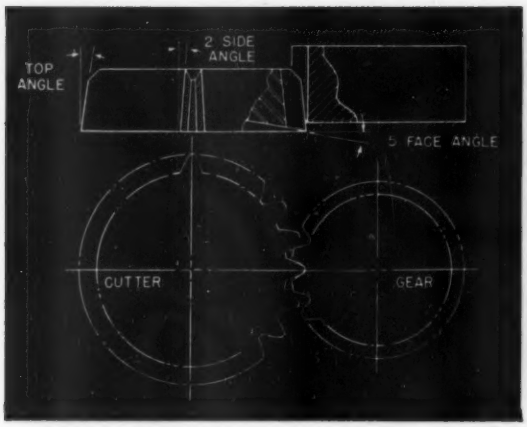
Generating method

Shaping gears has definite advantages, although it is generally conceded that "per-minute" cost is higher than for hobbing, because of the inherently slower process. However, many gears cannot be hobbed, as those with close adjacent shoulders, or with internal teeth. Regardless of the claims of superiority of one method of gear cutting over another, because of certain design conditions, some regular gears, almost all internal gears, and blind-hole gears must be shaped.

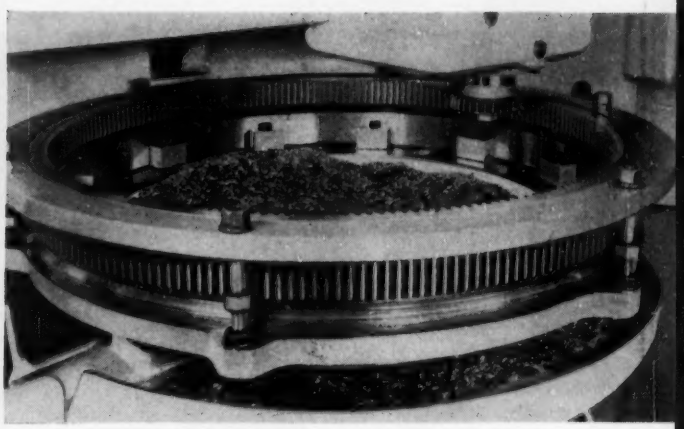
Prejudices against one gear-cutting method over

Generating gears by

Another method of shaping gears is by the form-tooth (Shear-speed) method. Its principle might be compared to a modern high-speed internal broaching machine. Gears generated by the shear-speed method can be either the open type, or shoulder type. The machine has been used for external and internal spurs, ratchets, splines, cam lobes, interrupted tooth forms and sprockets, and to a limited extent, external helicals of low helix angles. Because of required tooling, the machine should only be considered as a high-speed, high-production unit. The slotted cutter head is built to a high degree of accuracy, because errors in slot location would affect tooth spacing on cut gear. Form-tooth blade is ground with an angular hooked tail that is acted upon by an inner cone, causing blade to retract radially. After gear blank is placed on work spindle, cutter-head slide is actuated hydraulically to come down to cutting position, and locked by two wedges. Work mounting is securely anchored to top of a ram driven by means of a crankpin to a connecting rod, operating from a crankshaft. Work recipro-



SHAPER CUTTER MUST HAVE THREE RAKE ANGLES incorporated in its design. Two are usually fixed, a 5° face cutting angle, a 2° side clearance angle along tooth length. Top angle (or outside angle) varies with pressure angle. Its function is to maintain tooth depth consistent to tooth thickness throughout life of cutter. Shaper cutter is sharpened only on its 5° face angle, thus it remains a mating gear but only at the cutting face



BACKOFF RELIEVING MOTION of the workholding apron is a feature necessary in the gear shaper. At end of each cutting stroke, the workholding apron moves away from the cutter approx 1/32 in., and on a slight angle approx 7° to line of centers for the return stroke. Work apron assumes normal position preparatory to next cutting stroke. Design of machine and cutter lends itself to a short overrun of cutting stroke. Thus cutter face passes gear being cut, and is stopped short of adjacent shoulders

of shaping gears...

another are found throughout industry, but most reasons for prejudice have been eliminated. This can be attributed to efforts of various manufacturers to improve their product and to educate themselves and their customers.

The gear shaper can handle both spur and helical, internal and external gears, non-involute forms such as serrations, ratchets, sprockets, cam lobes, interrupted tooth forms, rectangular, triangular, and many-sided holes. Special attachments and fixtures permit production of eccentric gears and segments, as well as face gears. If the form can be generated, a tool can be provided to shape the piece.

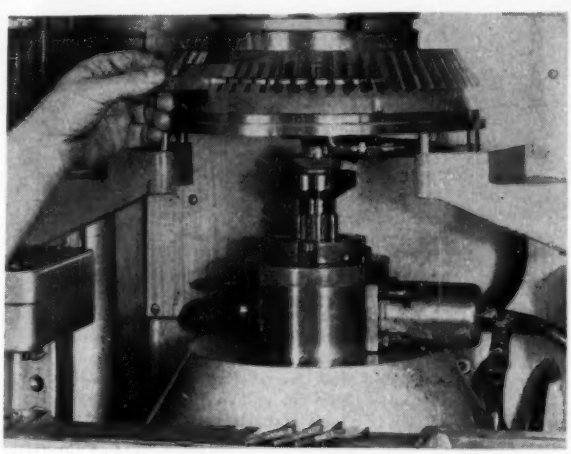
The only difference between shaping a spur and a helical gear is cutter design, and the need of a spiral guide instead of a spur guide. Guide is mounted on tool spindle to pilot cutter through its proper helical path. When cutting helical gears, guide must be included in tooling costs. It is suitable for use on one predetermined helical lead of a given hand, and is usually confined to use only with cutter of same hand of helix and same lead.

shear-speed method...

cates vertically during cutting cycle with length of stroke adjusted to suit face width being cut.

With each cutting stroke, cones feed downward a controlled amount. This causes the "feed-in" of blades through contact of the outer cone on the angular tail of blade. Downward feed of cones is achieved by means of a cam and ratchet mechanism. As the blade moves into greater depth, and more cutting edge engages gear being cut, same cam and ratchet mechanism progressively reduces amount of feed per cutting stroke. Final finishing strokes remove approx 0.0002 in. of material for fine surface finish.

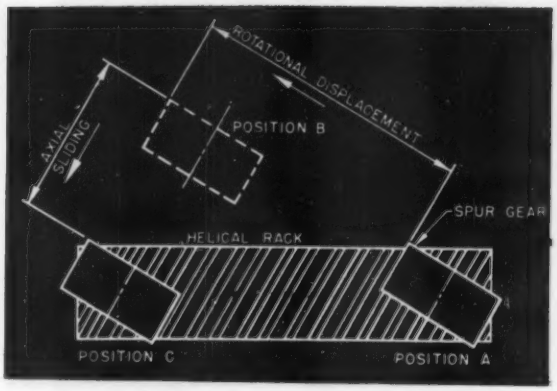
As each cutting stroke is completed, and work is on its down stroke, an eccentric relief cam raises the cone assembly slightly, and holds it in this position for downstroke of work. This causes inner cone to pull blades out of engagement with work. When cutting stroke starts again, cam returns the cones to their original cutting position for next cut. Relief action is independent of feed and performs identically on each return stroke.



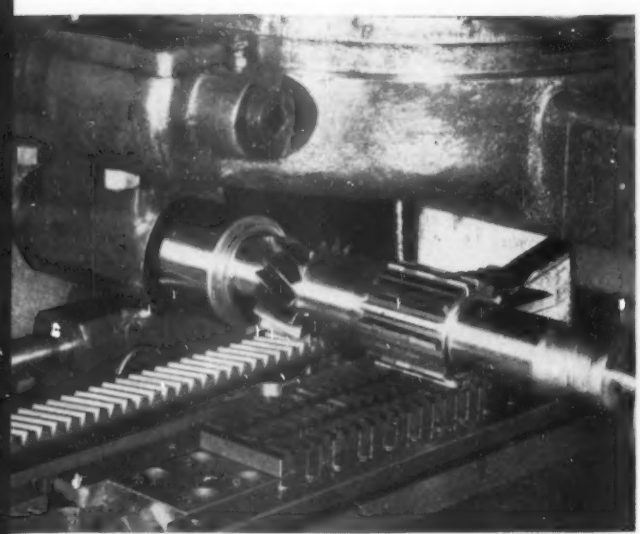
SHEAR-SPEED MACHINE operates on all teeth simultaneously. For each space in gear, a separate blade is required. Cutting edge of blade is a counterpart of gear space. All blades are identical to each other. During cutting cycle, each blade is taking its own bite out of gear blank. Blades nest into tool head assembly consisting of a retainer, housing, radially slotted cutter head, and a movable double cone-shaped guiding unit which controls feed

Gear shaving for close tolerance...

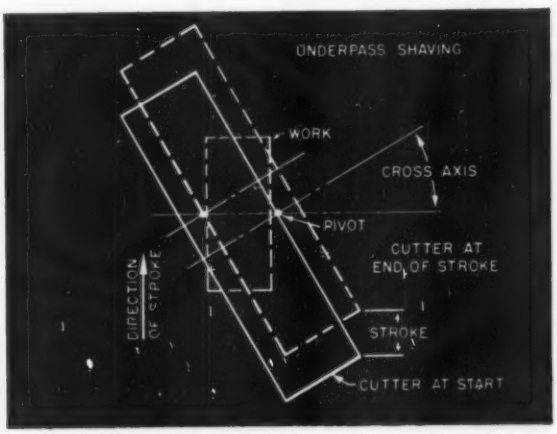
Gear shaving provides the means to finish gears accurately from miniature sizes to 15 ft in dia (for the largest gear shaver built in this country). This process results in highly finished profiled surfaces and improved tooth spacing and form. As a result gears will operate more quietly, run at higher speed ranges, and have longer operating life. Shaving is not a "cure-all" for spacing, form and runout errors; however, it will correct and improve a gear within limitations. The biggest factor is quality of the gear up to the shaving operation. Its face runout and pitch line must be controlled within limits, yet not unreasonable. Shaving is a precision operation at low cost to user; timewise, cost of shaving a gear is very low.



PRINCIPLE OF SHAVING shows a spur gear and helical rack in engagement. Spur gear at position "A" is at rest. Leaving the rack stationary, gear is rolled to position "B". Note its inherent tendency to roll in a plane parallel to its own sides and out of confines of rack, through rotational displacement "A" to "B". To keep gear within confines of rack, it must slide axially in direction shown to position "C". In actual shaving operation, gear is restrained from rolling to position "B", since it is fixed on a spindle. By this action, rolling and sliding of gear are simultaneous



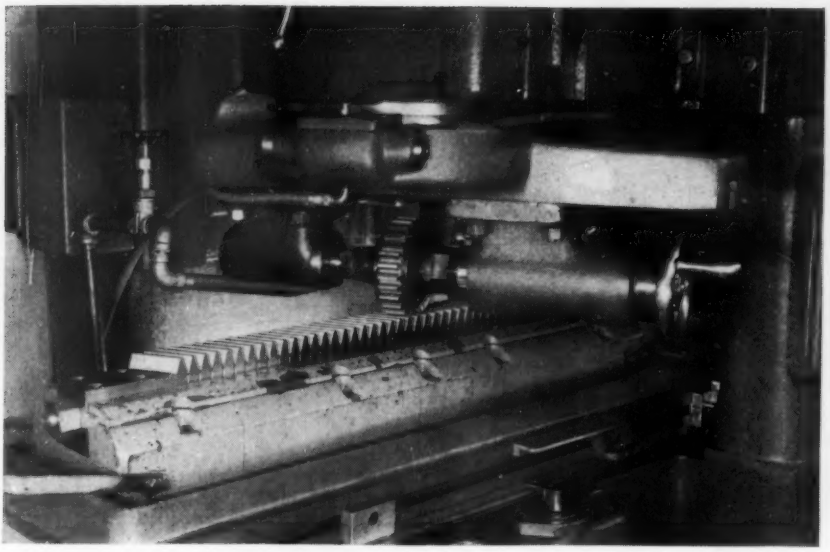
SPECIAL ARRANGEMENT FOR RELIEVING TOOTH PROFILES using the rack-shaving machine. Spur gear is relieved in two places on each tooth. Master rack and gear are used for obtaining proper control of rotation. Rack in mesh with spur gear is a special cutting tool designed to remove stock for relief areas. Cutting edge of tool is following path of true involute profile. This is a rapid and inexpensive method of relieving tooth flanks for clutch purposes



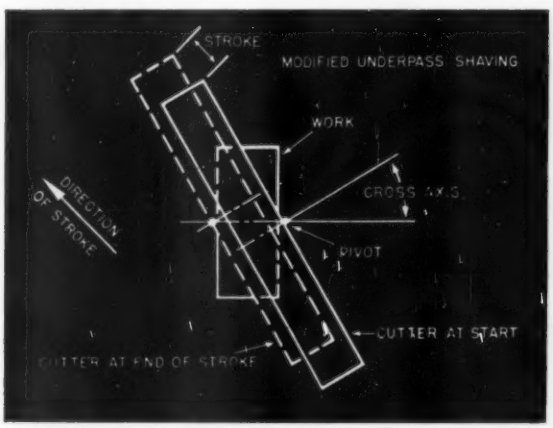
MODIFIED UNDERPASS SHAVING has the advantage of improved shaving action caused by feed in direction indicated. It allows a narrower tool face width, as compared to full underpass method

Rotary shaving...

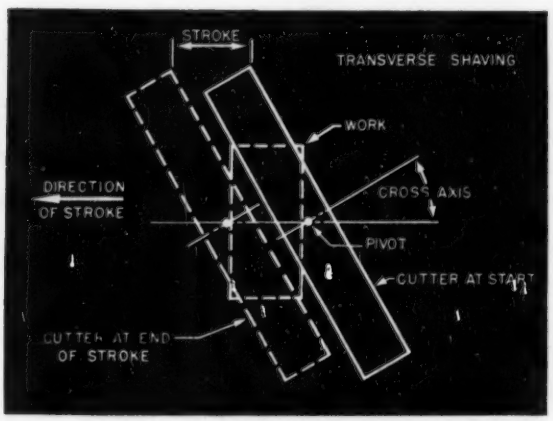
In the rotary shaving process, the rack is replaced by a serrated gear as the shaving member. Shaving tool and gear are engaged in mesh and rolled together at a predetermined speed. Only one of the members are positively driven and depending upon machine used and size of gear. Either gear or tool can be the driving member. To provide an understanding of rotary shaving, the pivot point should be explained. This can



STRAIGHT RACK IS USED for gears with helical teeth, and a helical rack for spur gears. This combination gives serrated cutting teeth a shearing action across their face as gear rolls across rack. Gear travels over rack a predetermined number of strokes, from 1 to 50 depending on the gear. Spindle heads feed the work into rack during shaving action by a definite downward pressure. Finishing gear teeth by the rack-shaving method, spur gear and serrated-tooth rack are at cross-axis. Amount of stock removed in shaving usually depends on pitch of gear being shaved



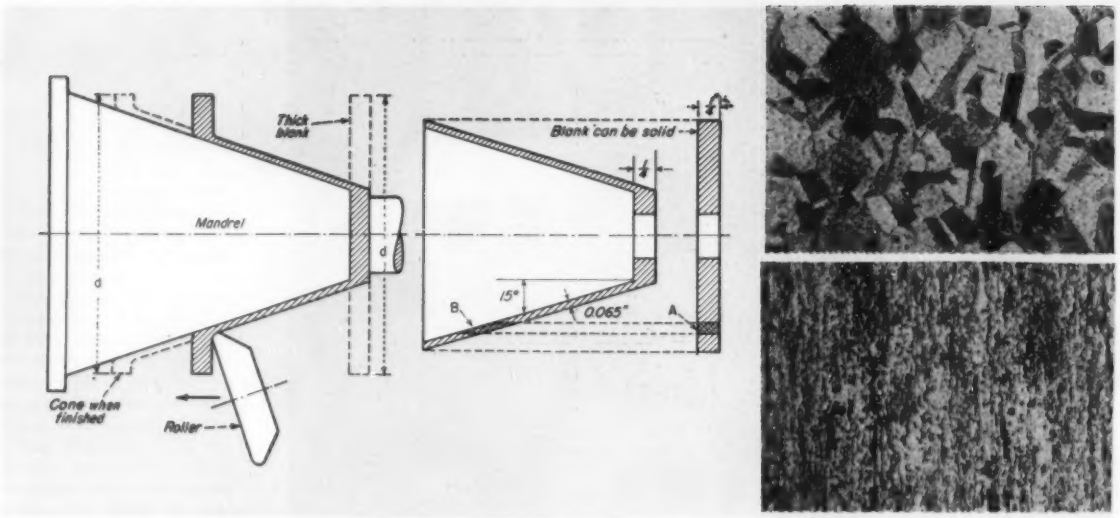
UNDERPASS SHAVING METHOD is used for clearing interfering shoulders. Note how pivot point advances across gear face, as required during shaving, when tool feed is in direction indicated



TRANSVERSE SHAVING METHOD is desirable for extreme widths of gear face. Note pivot point in respect to cutter has remained unchanged during shaving pass, permitting still narrower tool. With any one of these methods, crowning of gear can be accomplished. Grinding shaving-tool tooth with a concave curve for underpass method and a crowning attachment for the machine for transverse and for some modified underpass are the two means used for gear tooth crowning

cross-axis method

best be described by considering two cylinders of equal length laying parallel to each other, and touching. The line of contact between two cylinders extends their entire length. When the axis of these cylinders are skewed approx 45° to each other, the line contact now becomes a point contact or pivot point. This point is an important factor to shaving, as it has a very definite relationship to contact of pitch diameters, and line of action between the gears. The pivot lies on a straight line between the two centers. Control of pivot is obtained on shaving machine by use of spacers. This same pivot point must be controlled to completely traverse the full face width of gear, to shave gear completely for its full face width. Three methods are in general use to achieve this movement in rotary shaving: transverse, underpass, and modified underpass.



Principle of Floturn Process

METAL is displaced horizontally as the pressure roller traverses a path parallel to the side of the mandrel. Metal at *A* is thinned to fill area *B* in the cone. Microstructures of original material (top) and "flowed" metal (bottom) shows refinement of grain structure of Type 302 stainless by extreme coldworking that doubled tensile strength. Magnification: 250X

ROLL FLOWING *saves operations and conserves*

Processes that shape parts by plastic deformation usually require mass-production quantities to show economies. An entirely new concept in plastic deformation, the Floturn process, appears practical for small as well as large lots

Parts of revolution—hollow cones and cylinders of regular contour or varying cross-section, with indented or corrugated surfaces and with flanged ends—can be made by the Floturn process. Both hard-to-work and ordinary materials can be transformed from a simple blank into a part of considerable complexity—while saving operations and improving the tensile strength. No material waste is involved except the scrap skeleton when blanking flat-rolled materials, or chips cut away from a forging or casting to make a special blank.

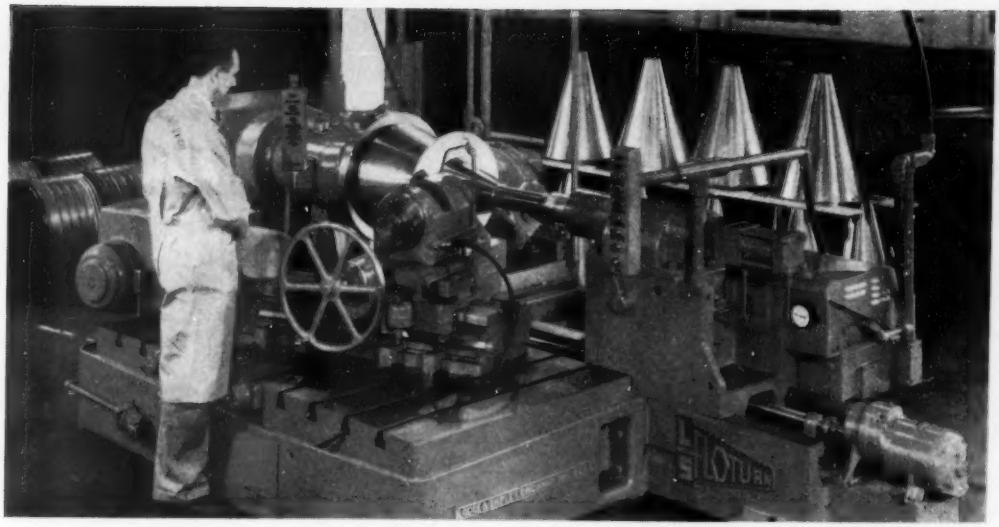
Although the Floturn process is related superficially to spinning, there are important differences. In spinning, the blank diameter is considerably larger than the product diameter, the metal is folded down onto a mandrel or chuck, pressures are moderate, and the metal is seldom thinned to any great extent. In the roll "flowing" process, the blank is exactly the same diameter as the finished product, the metal is thinned as much as 75% or more in one pass by plastic deformation, and the tensile strength and hardness are increased. The metal is worked against a hardened mandrel by the radiused periphery of a roll or rollers traversed at constant rate, so that the metal is formed gradually. No metal is removed.

Regardless of metal, workpiece dimensions depend almost entirely on mandrel accuracy and how closely the roller follows the mandrel. Even with considerable reductions, wall thickness can be held within ± 0.002 in.

Metal ahead of the roll is not disturbed. Hence by stopping the roll carriage, you can leave a flange of original blank thickness.

Extreme cold working by the Floturn process increases tensile strength of the work material. Tests on annealed, cold-rolled Type 302 stainless steel parts showed a 100% increase in tensile strength, while hardness was increased to 57-59 $R_{30\text{-}N}$ (Rockwell superficial 30 kg load).

Despite rapid cold working, reductions in wall thickness of 75% and more in one pass have been found to be possible. This is true even when working some of the more difficult-to-form metals. With the 20-hp No. 40 Floturn lathe (see page 150), cones and cylinders can be formed from blanks up to 5/16 in. thick in 300 and 400 series stainless steels, ti-



METALS RANGING IN WORKABILITY from aluminum to titanium have been roll-formed with the Floturn process. Simple blanks can be shaped to form cones or cylinders

material

CLAUS L SPORCK,
research & development engineer,
FLOTURN DIV,
THE LODGE & SHIPLEY CO

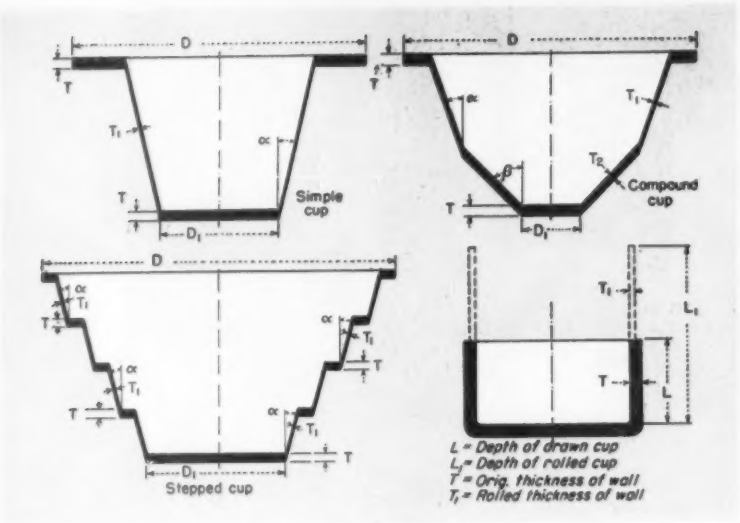
tanium, Monel, K-Monel, Inconel, Inconel-X, Timken 16-25-6 and 17-22S alloys, Haynes Multimet and Universal Cyclops Uniloy 19-9 alloys. Easier-to-work metals, like mild steel, aluminum, copper and brass, can be formed from blanks up to ½-in. or more thick.

There are limits to what can be accomplished in one pass. Seldom can a flat blank be formed in one pass into a cone with less than 30° included angle. It is better to preform the blank by either press forming, machining, or roll "flowing" to an intermediate shape. If several Floturn "flowing" operations are used in sequence, annealing between passes is seldom used.

Mandrels can be made to form a simple cone or cylinder or stepped to permit forming more complicated shapes. Generally,

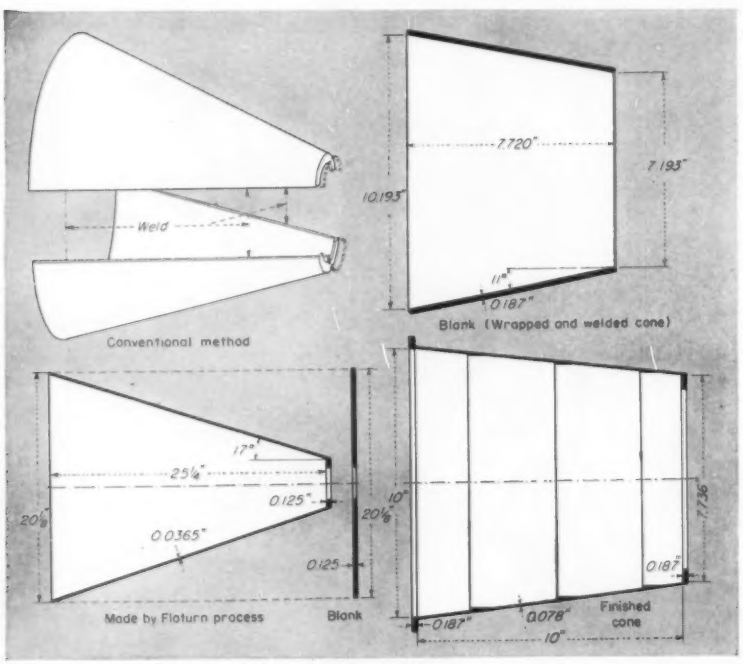
Cones and cylinders produced accurately

DISKS up to 42 in. OD max can be formed into simple cones or cylinders, or more complicated shapes. Minimum ID inside small end of cone is ½ in. Forming pressures are so heavy that any laminations or inclusions in rolled, forged or cast blanks quickly show up as fractures in side walls of roll-"flowed" parts. **DOUBLE-CONE PART** (lower left) can be made from flat blank by rolling on stepped mandrel, or by using two different mandrels. **CONES WITH ARCUATE SIDES** (upper right) can be produced when tracer control is applied to the roll slide of the Floturn lathe. Wall thickness, 0.045 in.; blank thickness, ⅛ in. **THREE OPERATIONS WERE USED** on piece at lower right: (1) conical base rolled on conical mandrel, (2) straight wall rolled by thinning and elongating on cylindrical mandrel, (3) grooves produced by resetting roll pressure at intervals. **PRESS-FORMED CUPS** (center right) often are best blanks for rolling slow-taper cones or straight-wall cylinders. Stainless cup; cone, two passes


Simple cup
Compound cup
Stepped cup
L = Depth of drawn cup
L1 = Depth of rolled cup
T = Orig. thickness of wall
T1 = Rolled thickness of wall

Rolling and reducing cups

THICKNESS OF SIDE WALLS of simple, compound and stepped-cone cups depends on thickness of blank, wall angle (½ included angle of cone) and setting of roll relative to mandrel. Formulas are: $T_1 = T \sin \alpha$ and $T_2 = T \sin \beta$. Dia of cup bottom D_1 is 0.5 in. as minimum. Deep-drawn cylindrical cups can be reduced according to formula $L = L_1 T_1 \div T$



Use of welded blank depends upon total cost

INNER EXHAUST CONE (left) was made by forming and welding stainless. Flaturn process (below) makes a stronger part. Reduction in metal thickness, 72%; speed of rolling, 300 rpm; feed 2 ipm. Wrapped and welded cone (upper right) is the blank for flanged part (bottom right) with steps in bore. Conical blank was flanged at small end in press, then flow rolled to thin the wall and produce the steps

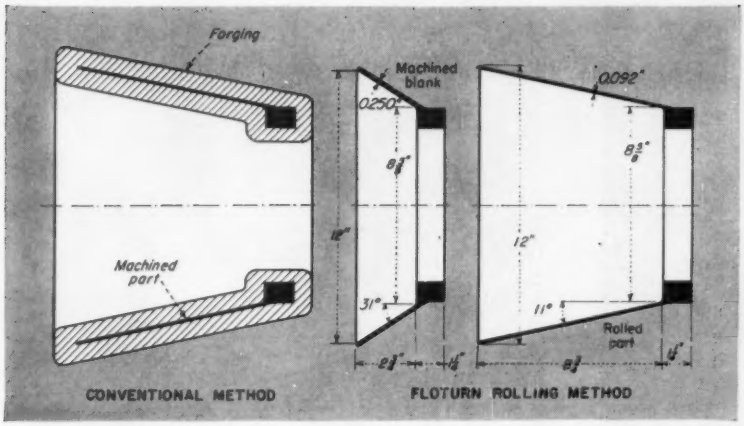
mandrels are made from tool steel, hardened and drawn to 58-60 R_c, then ground and polished to a smooth surface. Any imperfection in the mandrel surface will be reproduced in the workpiece bore. Large mandrels have been successfully cast to shape, the wall thicknesses being at least 1¾ to 2 in.

Pressure roller is HSS hardened to 68-70 R_c and supported by Timken bearings. Roller pressure surface is ground and polished to a very smooth finish. It must be redressed immediately if any scratches or nicks develop.

For blanks to 5/32 in. thick, 10-in. OD rolls are used. These have a 1/16- to ¼-in. radius at one edge of the periphery and the face beveled at 15 to 50° depending on the severity of the forming operation. For forming heavier sections, 10 and 12-in. OD rolls with ¼ to ¾-in. radius, and often with a straight face, may be necessary.

A lubricant-coolant must be flowed onto the work immediately ahead of the point of contact with the forming roll. Little difference in results is obtained when using light and medium viscosities of lubricating oils, cutting oils, and conventional shop mixtures of soluble-oil coolant bases with water.

Speeds and feeds depend on the malleability of the metal being "flowed," the part diameter and thickness and strength of the wall



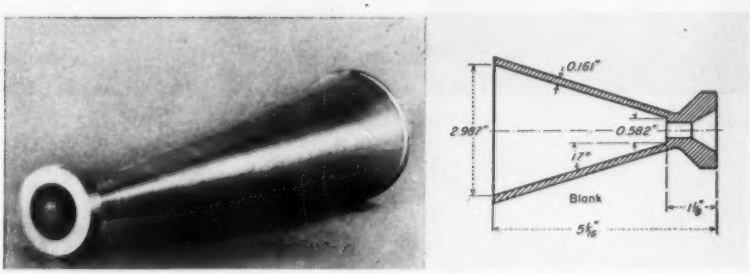
MACHINED BLANK is made from shorter forging, saving material. Metal in blank cone is then rolled out to desired thickness and cone angle. The same idea has been applied to making a flanged sleeve from a centrifugal casting

Types of products that require preformed blanks

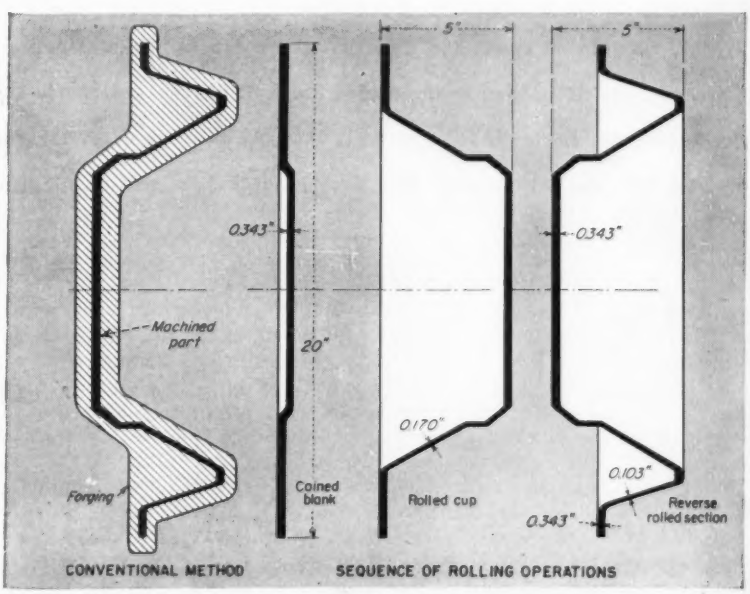
section. Fast speeds and slow feeds and with large radii on the roll generally result in better surface finishes. No definite rules have yet been determined for the proper combinations of these factors for different jobs.

Blanks include: (1) flat pieces —round, square, hexagonal, octagonal, depending on shape of any flange to be left at end of part, (2) cupped blanks, (3) shaped cylindrical blanks machined from forgings, centrifugal castings or press-formed shapes, or (4) cones or cylinders made by wrapping sheet or shaped (rolled or extruded) stock into desired shape around a form and welding the joint. In the last case, the extreme cold-working achieved increases the physical properties of the metal in the weld to that of parent metal.

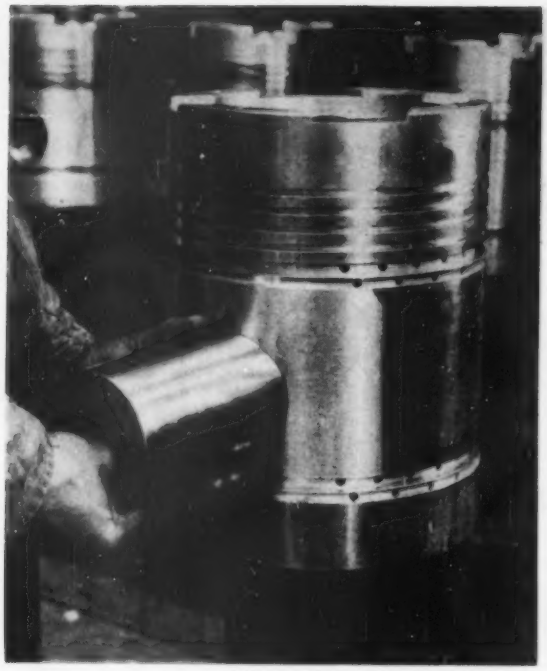
In bringing the process to its present stage of development, we have been fortunate in having the cooperation of Arthur A Merry, Chief, Advanced Tool Engineering Dept, Pratt & Whitney Aircraft Division, United Aircraft Corp. He has assisted us both by indicating the need for improving present methods of making difficult-to-produce parts, and by consulting on means for adapting the Floturn process to the forming of parts from difficult-to-work metals.



STAINLESS-STEEL NOZZLE 12⅛ in. long is made by three Floturn rolling operations applied to screw-machine part 5-1/16 in. long. Taper of machined blank is 17° per side of finished part, 2⅝ in. per ft included angle



BEARING HOUSING is conventionally machined from a forging. Two rolling operations on a coined blank total 24 min. Tool cost was $5000 for two mandrels



GUDGEON PIN (WRIST PIN) IS INSERTED with piston warmed to at least 150F. Heating is done in electric oven with thermostatic control close to fixture table

PISTON RINGS ARE ADDED after being checked for gap clearance, then assembly is sprayed with graphite-oil mixture that lubricates moving parts when engine is first test-run

Cylinder assemblies speed up

Pistons, connecting rods, and cylinder liners are put together first; then the assemblies are added to the engine block at Mirrlees, Bickerton, & Day, Ltd, Stockport, England. The reason is that the larger end of the connecting rod will not fit through the liner. And here's how it's done. . . .

Out in the field, pistons and connecting rods for J-series diesel engines are removed and replaced in the engine through the crankcase doors of the cylinder housing. But this method is too slow for assembly techniques.

It is impossible to install the connecting rod through the top of the cylinder because the large crankshaft end of the rod will not pass through the cylinder liner. Thus, the only answer was to keep the cylinder liners away from the engine block until after the pistons and rods had been assembled.

The work is done at a merry-go-round table where the connecting rods are held vertically on special fixtures. The piston is fairly easy to add, and the rings go on smoothly. Cylinder liners come to the assembly point from a 1500-psi static-pressure test, each with a smoothly chamfered cast-iron apron ring attached. This guides the liner as it is dropped over the piston by electric hoist. After the liner has been attached temporarily to the piston, the guide rings are detached, dropped, and left behind when the assembly is lifted off the fixture.

This method of assembly helps in conducting a water-pressure test of the whole engine assembly. A clamping plate on top of the cylinder liner—used to attach the liner to the piston until after complete assembly, has rubber washers that block off water-outlet holes in the cylinder housing. Then 60 psi can be applied to the engine water jacket for testing.

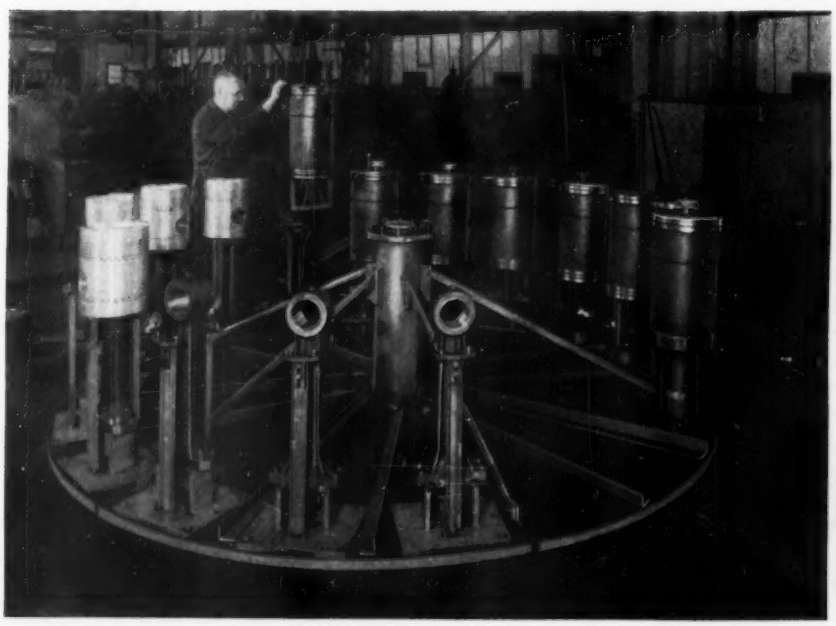
After the test, the plate and washers are removed, and the block goes along its way toward final run-in and acceptance.

ENGINE BLOCK IS SWUNG 22½° on a curved track section to put cylinder openings vertical. Cylinder assembly is dropped into position, then rubber sealing rings and copper gasket are tightened

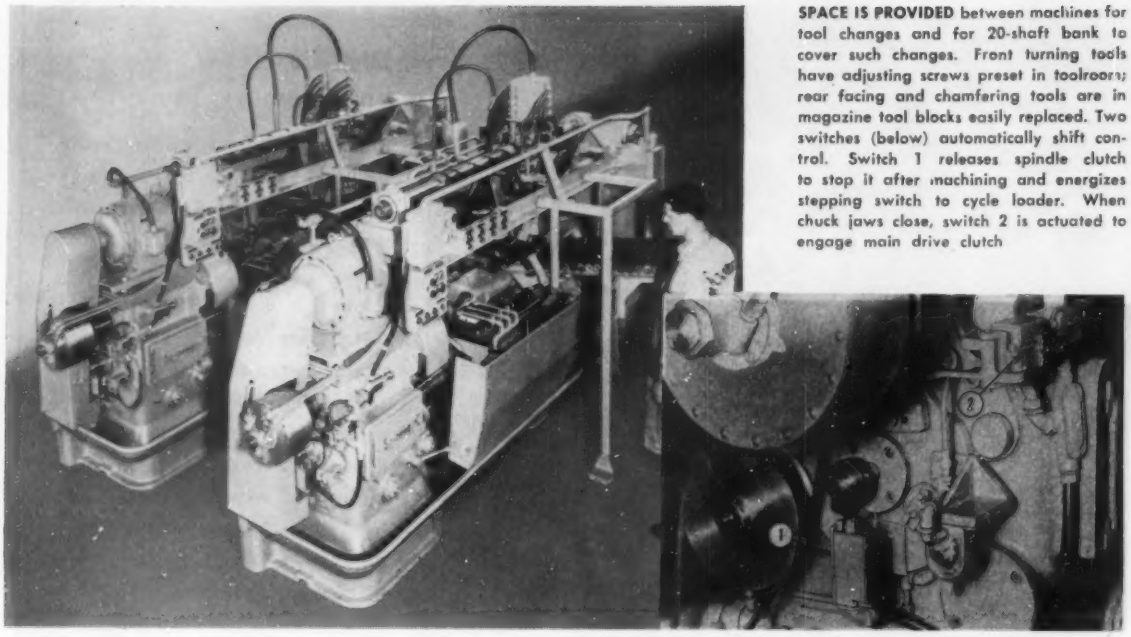
Big diesels on assembly line...

MBD's flow line is evidently the first to work on diesel engines as large as 3000 hp. There are two series of engines, the J and the K, which differ in that J is in-line, while K is V-form. Cylinders and pistons are constant in size, so engine power outputs are built up from 165 to 3000 by adding cylinders, from three to 12. This special assembly of cylinders is one of a number of methods changes that have made possible high production. If it had not been made, pistons would have to be assembled through the bottom of the block—which is all right for field service, but too slow for the plant

diesel production



SUBASSEMBLY OF THE PISTON, CYLINDER, AND FITTINGS is made at rotary table where a set of 8, 12, or 16 cylinders is made up for an engine block. Piston rods are mounted on fixtures, then pistons are set in place



SPACE IS PROVIDED between machines for tool changes and for 20-shaft bank to cover such changes. Front turning tools have adjusting screws preset in toolroom; rear facing and chamfering tools are in magazine tool blocks easily replaced. Two switches (below) automatically shift control. Switch 1 releases spindle clutch to stop it after machining and energizes stepping switch to cycle loader. When chuck jaws close, switch 2 is actuated to engage main drive clutch

Automation . . . combines standard

clears working area, provides backlogs

Two standard lathes equipped with automatic handling take parts from and to conveyor, with interlocked gaging to indicate any tolerance giving trouble. V-shape slide carrier inserts or removes parts from chucks 6 in. deep, retracts to clear cutting zone

E J TANGERMAN, executive editor

> **"Ford** is looking to machine-tool builders to assume responsibility for the design and procurement of automation—the intermachine materials-handling equipment—in the future. This is a job for specialists in the machine-tool industry and should be considered an integral part of the machine we purchase . . . Automation should not be left to the customer to do the best he can for himself . . ."
>
> H Rourke
> then general purchasing agent
> Ford Motor Company
>
> (From an address to American Machine Tool Distributors Assn in Cincinnati, April 16, '53, *AM*—April 27, '53, p172.)

Automation superimposed on two standard 5 x 34-in. Lo-Swing lathes by Seneca Falls Machine Co engineers, while not designed for Mr Rourke's employer, is nevertheless an answer to the need he expresses. It is designed by the builder for his own machines and incorporates several unusual elements:

1. Working areas of machine tools are clear for tool changes and during machining.

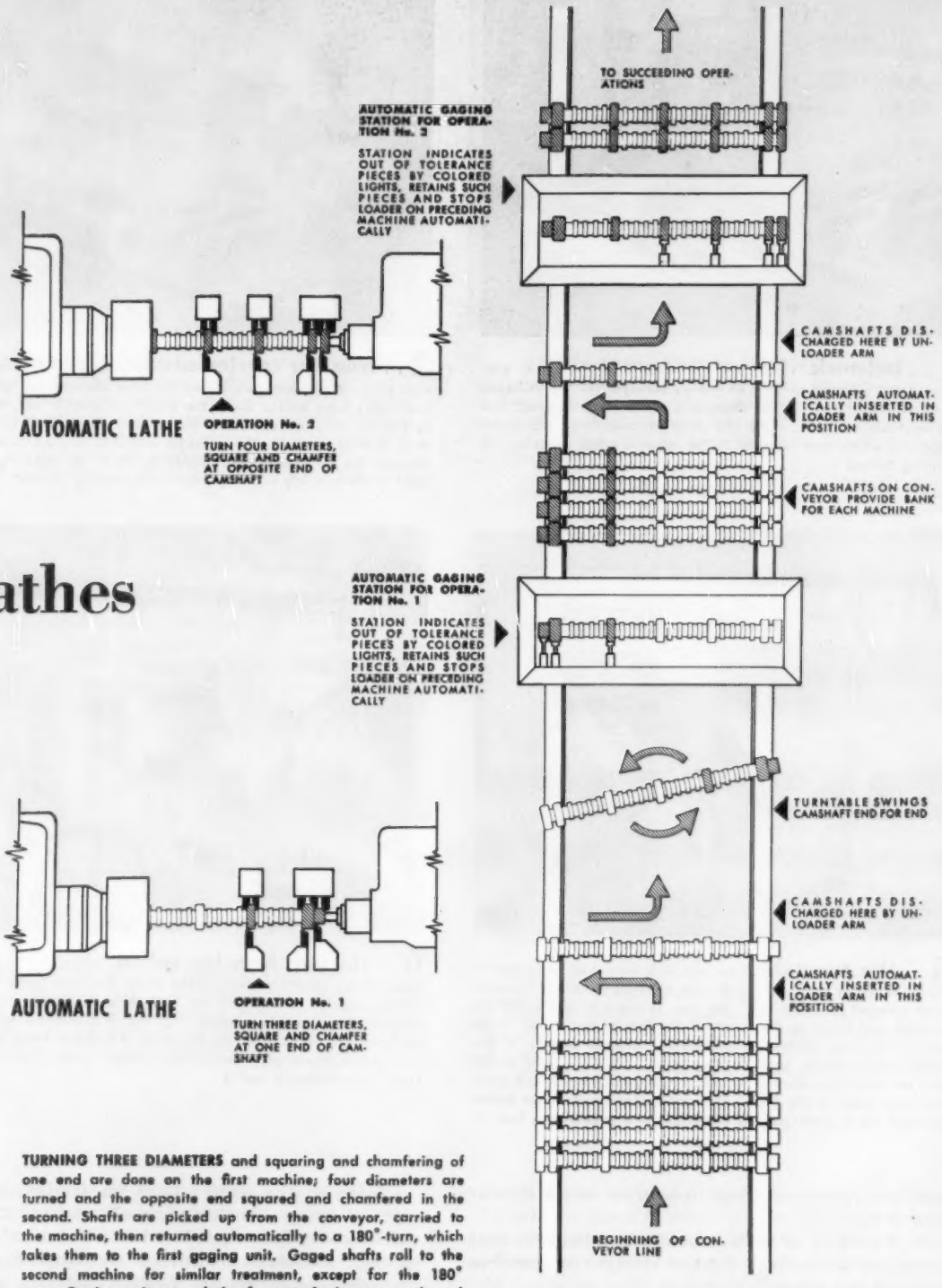
2. The operator, should he wish to do so, can stand in normal operating position, because the conveyor and automation devices are at the far end, not over the working area.

3. The loader and unloader slide on a V, so each, in its extended position, holds the part at the machine centerline, and they are interlocked to operate alternately.

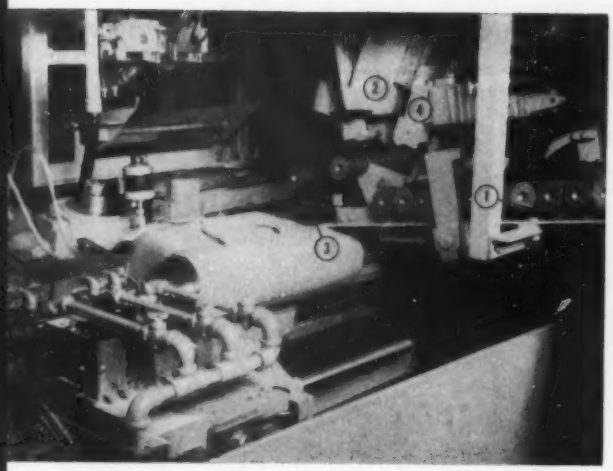
4. Loader and unloader dip as they lower, so a long part can be inserted as much as 6 in. into a chuck body for chucking close to cutting tools.

5. Automatic gaging after each machine is interlocked to shut down the machine if any dimension

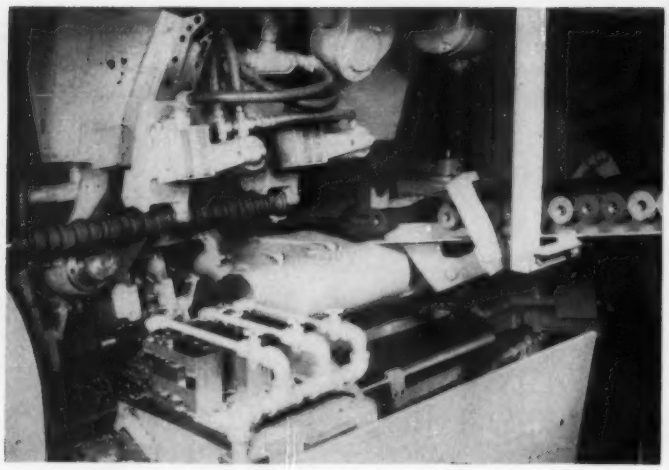
lathes


TO SUCCEEDING OPERATIONS
AUTOMATIC GAGING STATION FOR OPERATION No. 2
STATION INDICATES OUT OF TOLERANCE PIECES BY COLORED LIGHTS, RETAINS SUCH PIECES AND STOPS LOADER ON PRECEDING MACHINE AUTOMATICALLY
CAMSHAFTS DISCHARGED HERE BY UNLOADER ARM
CAMSHAFTS AUTOMATICALLY INSERTED IN LOADER ARM IN THIS POSITION
CAMSHAFTS ON CONVEYOR PROVIDE BANK FOR EACH MACHINE
AUTOMATIC LATHE
OPERATION No. 2
TURN FOUR DIAMETERS, SQUARE AND CHAMFER AT OPPOSITE END OF CAMSHAFT
AUTOMATIC GAGING STATION FOR OPERATION No. 1
STATION INDICATES OUT OF TOLERANCE PIECES BY COLORED LIGHTS, RETAINS SUCH PIECES AND STOPS LOADER ON PRECEDING MACHINE AUTOMATICALLY
TURNTABLE SWINGS CAMSHAFT END FOR END
CAMSHAFTS DISCHARGED HERE BY UNLOADER ARM
CAMSHAFTS AUTOMATICALLY INSERTED IN LOADER ARM IN THIS POSITION
AUTOMATIC LATHE
OPERATION No. 1
TURN THREE DIAMETERS, SQUARE AND CHAMFER AT ONE END OF CAMSHAFT
BEGINNING OF CONVEYOR LINE

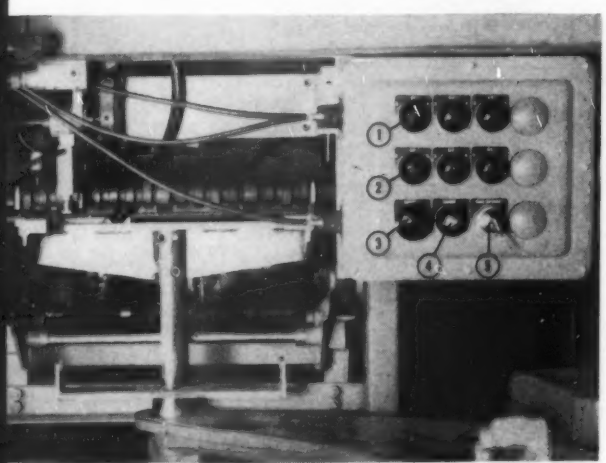
TURNING THREE DIAMETERS and squaring and chamfering of one end are done on the first machine; four diameters are turned and the opposite end squared and chamfered in the second. Shafts are picked up from the conveyor, carried to the machine, then returned automatically to a 180°-turn, which takes them to the first gaging unit. Gaged shafts roll to the second machine for similar treatment, except for the 180° turn. Gaging units stop lathe for out-of-tolerance work and signal which dimension is wrong while retaining gaged piece



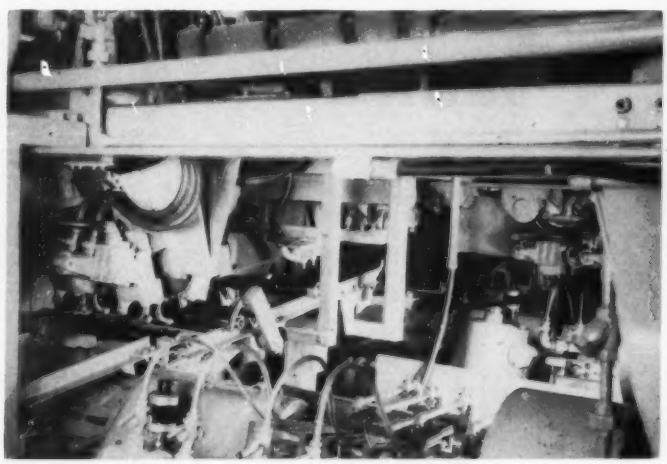
1 . . tailstock view of first machine shows parts, end-ground and centered, arriving on gravity conveyor (1). The V-shaped work-transfer carrier (2) has dropped a semifinished camshaft into the turntable cradle (3), and a new piece has been lifted into loader fingers (4) which have clamped it. This happens while workpiece (5) is being turned



2 . . transfer carrier advances to the loading position, carrying the rough work over the lathe center. Front and rear tool slides have moved back, the headstock spindle has stopped, and chuck jaws are open, but the tailstock spindle still holds the work between centers. The unloader arm has reached down and clamped the semifinished part ready to lift it. At right, the turntable cradle is empty and a new part is in loading position



5 . . the turntable, an arm with small and large sprockets connected by endless chain, in ratio so swinging causes the outer small sprocket to rotate 180°, has now swung over and raised the reversed part by air to the automatic Sheffield gaging heads. If the part is OK, it is released to the gravity conveyor below. If any dimension is oversize, corresponding green light (1) is lit; if undersize, red light (2) is lit; and the machine stopped at cycle end while the piece stays in the gage. This panel also carries reset button (3), light (4) to show gage is operating, and gage-bypass lock (5)



6 . . the part here has rolled halfway down the conveyor to the second-machine pickup point. The work loader for the second machine is visible. If the bank of parts between machines exceeds the allowable number (20), the first machine will automatically shut down until the overstock is reduced. Note overhead helix which moves work loader forward and back. Cycles are the same on machines 1 and 2

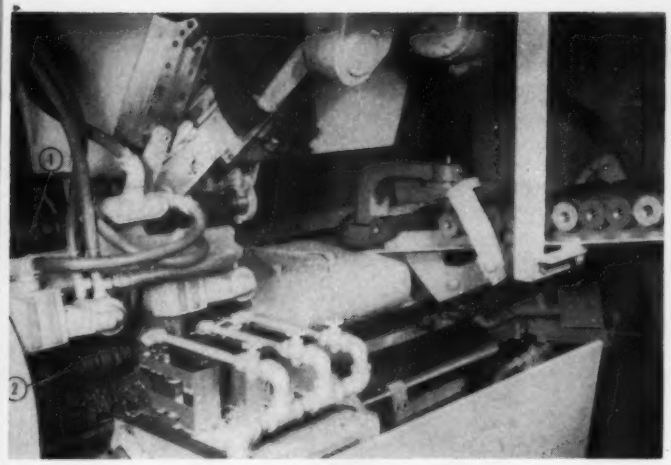
goes out of tolerance and to indicate which dimension it is.

6. A backlog of parts is maintained between machines, so a shutdown for tool changes on one does not halt the other.

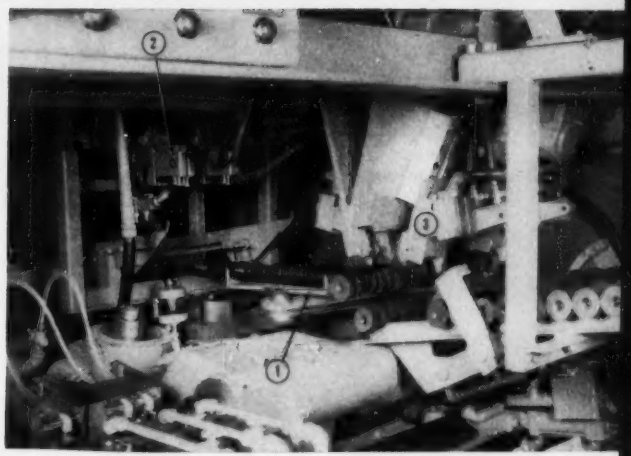
7. Tools are carried in toolroom-set blocks for rapid changes.

8. Straight-line conveyor simplifies plant layout.

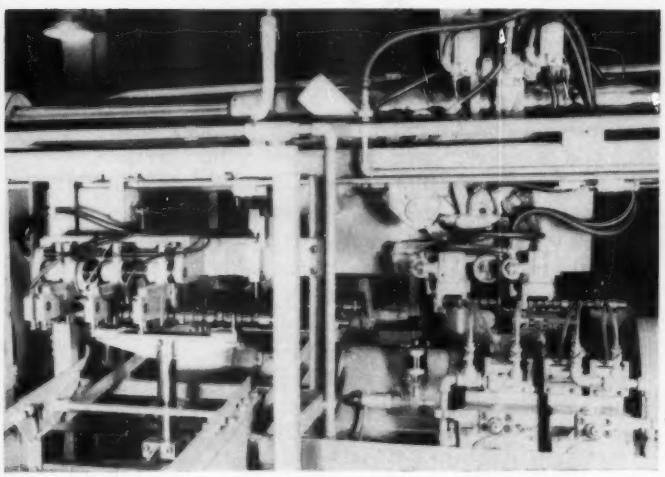
Obviously, the setup attains the familiar advantages of automation including elimination of manual-handling fatigue, reduced labor and unit costs through automatic machining and loading cycles, improved quality control through automatic gaging, reduction in work spoilage and salvage cost, reduction in number of operations, avoidance of damage to parts and of accidents from hand loading.



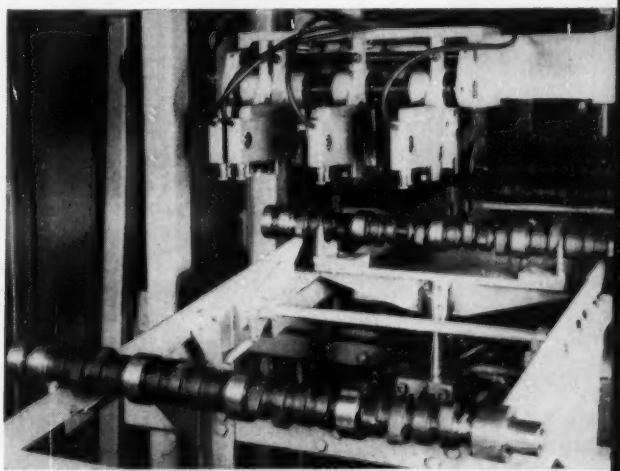
3 . . tailstock spindle has now retracted, and unloader has lifted the semi-finished shaft (1) to raised position, loader arm has dipped to place rough shaft (2) 6 in. into chuck between centers. When tailstock advances, loader fingers will release and loader retract. Chucking the piece minimizes distortion. The 3-jaw Logansport air chuck has diamond-serrated carbide disks for quick change. Tailstock and work loaders are also air operated under electrical control



4 . . part is now between centers, with chuck jaws closed and headstock-spindle clutch engaged. The semi-machined part has been dropped onto the turntable cradle (1) which is swinging over and has turned the piece halfway end for end. It will turn it fully around and lift it to the gaging station (2). The loading arm (3) has received a new rough part



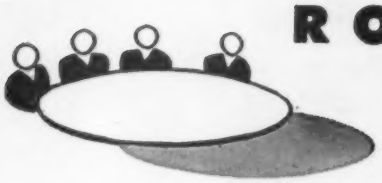
7 . . here is the second gaging unit (with cover removed) and finished part in place, pictured from outlet side of second machine. The first machine has a 3-unit gaging assembly, the second a 4-unit. Transfer carrier has finished pickup over centers and is ready to return to rest position over conveyors



8 . . one gaged part has been released to roll down the discharge conveyor, while another is about to be raised for gaging. Note spring-operated dogs on conveyor end that lift part off air-lift to gage and micrometer screws for adjusting minimum and maximum dimensions on each of the four gaging heads. Outer (non-gaged) end of camshaft comes up to adjustable screw stop to hold it level

The part shown in these setups is an automotive camshaft of 50 MTS cast iron, of 228 to 229 Bhn. It is machined at 270 fpm (500 rpm), 0.012-in. feed, 6-ipm carriage travel and 1⅜-in. stroke on the first machine; 222 fpm (412 rpm), 0.012-in. feed for turning and 0.006 in. for back turning, 5-ipm carriage travel and 1 5/16-in. cutting stroke on the second machine. Cycle times are the same on both units, so output is 110 to 120 shafts per hour from the setup.

Location in the first machine is on the centers and chuck to assure material for cleanup, in the second machine against the turned end. In each machine, front tools face while rear ones chamfer and do side facing of both sides of the journal. At the first position, a cam-operated tool from underneath puts in grinding relief on the shaft.



ROUND TABLE

Prima Donna

"What am I going to do with Old Man Stone, Ed? I think he's about to quit, and I hate to see the company lose his experience and imagination."

"He's an old problem, Al. The guy could have been foreman, or could have come into my toolroom, but he wouldn't budge. I don't suppose there's a man in the country who knows more about screw machines and how to set up odd jobs."

"I talked to him, but I can't figure him out. He's got all the makin's for a sort of toolmaker—he builds his own tools and fixtures—but he wants to stay in the production shop."

"Yeah; I think he really loves to do a tough setup job, but once it's done he wants to just sit back and watch the machine operate."

"The trouble is, Ed, he won't work on just an ordinary production job—it has to be a toughie. I tried to get him to do some regular work when there wasn't anything special on, and you'd have thought I asked him to sweep floors, the way he reacted."

"I don't know, Al. Stone is a kind of genius, in his own way; but he can't be molded to fit the company. I guess all you can do is go along with his odd ways and hope you can keep him busy."

"But I can't give him a day off if there's nothing for him to do. We get a lot of troublesome screw-machine jobs, but not enough to keep him working all year long. How can I justify his pay if he loafs two days out of the week?"

"You shouldn't have any trouble on that score, Al. Just add up the mean jobs he's solved in a year, and divide them by his gross pay. I'm sure you can prove to the front office that he's saved the company thousands."

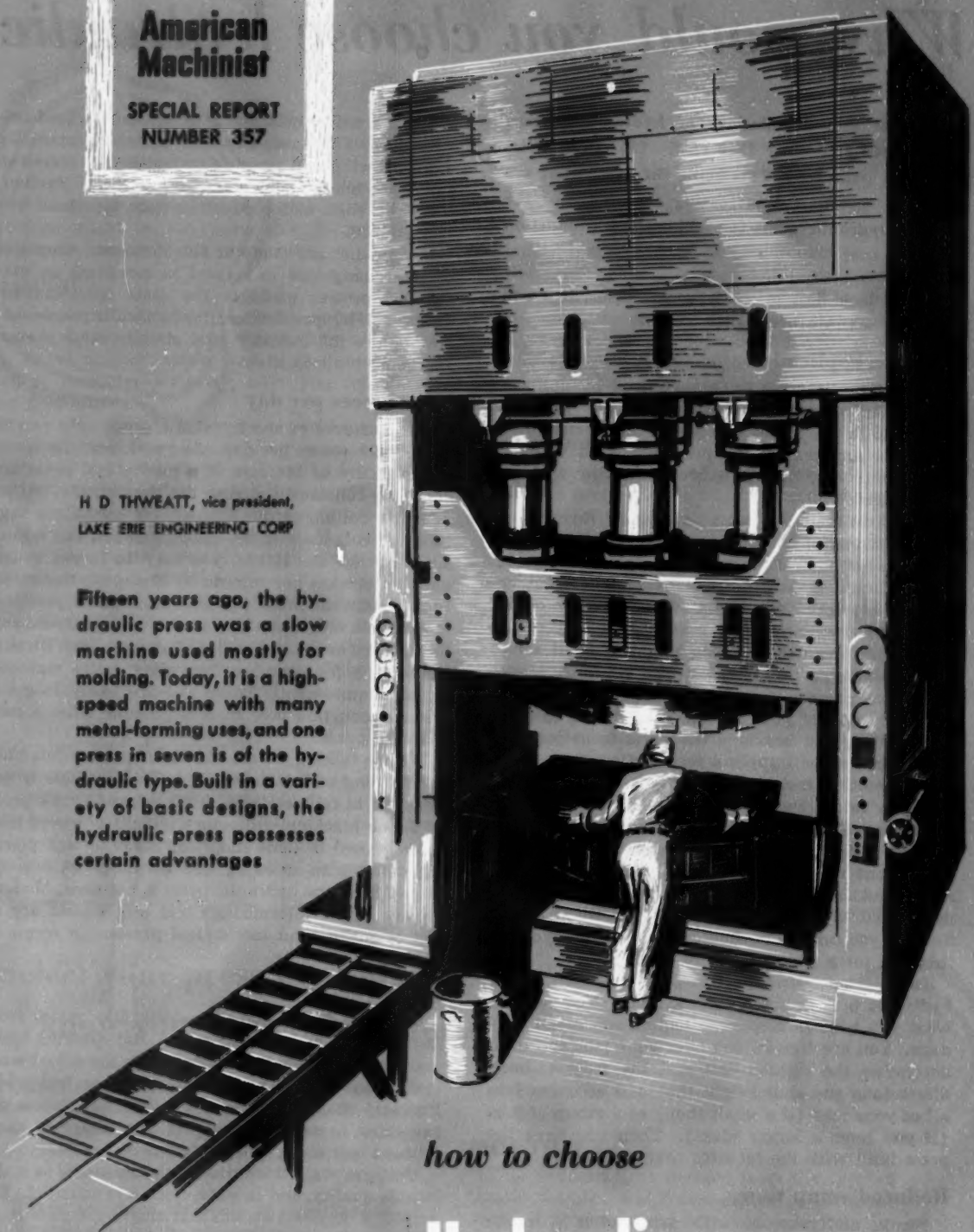
"Oh, I'm sure of that, Ed; but it does look funny when he just sits there, waiting for a job to come along."

"I suppose he would make you uncomfortable, Al; but everyone around here knows he's a special case and they allow for it. I don't think Harrison would say anything—in fact I'll bet you couldn't fire Stone and get away with it. Harrison would throw a fit."

"Maybe, Ed; but I just don't like to see such a skilled man sitting around, doing nothing."

Is this special case the only one of its kind? What can a foreman do with a man who's hot on tough jobs, and who sneers at ordinary work? Can you let a toolmaker stay out of the toolroom? Your ideas on the subject may be of help to others. Discussions of earlier topics appear on later pages.

American Machinist
SPECIAL REPORT
NUMBER 357



H D THWEATT, vice president,
LAKE ERIE ENGINEERING CORP

Fifteen years ago, the hydraulic press was a slow machine used mostly for molding. Today, it is a high-speed machine with many metal-forming uses, and one press in seven is of the hydraulic type. Built in a variety of basic designs, the hydraulic press possesses certain advantages

how to choose

Hydraulic presses

for metal forming operations

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Why would you choose hydraulic

It's a fact that installations of hydraulic presses have gained 21% since 1949 (AM—1954 Production Planbook, page D1.) This being the case, what are the basic reasons for increasing acceptance of the modern hydraulic press for jobbing and production work?

Let us look first at machine characteristics and how they fit into press-shop needs:

Pressure application

The hydraulic press is characterized by uniform application of pressure throughout the working stroke, up to the preset tonnage. If an overload develops for any reason, the press will stall without harm. There is no linkage to break, and dies will not be damaged.

These two factors affect your original investment and maintenance costs.

With a mechanical press you must remember that the maximum pressure is usually developed at or near the bottom of the stroke. This limitation is inherent in a machine using a crankshaft or eccentric. To get the pressure that you might need at some less favorable portion of the stroke, you must use a mechanical press with a higher tonnage rating. This can easily double your investment. Again, to prevent stalling and breaking the press from possible overloads, you will apply a factor of safety.

On the other hand, with the hydraulic press you choose a rating that will handle the pressure requirements of the job or jobs that you intend to run on the machine. Because pressure is uniform throughout the working stroke, you can do long-stroke and short-stroke work in the same press. This means that where a 300-ton crank press would be indicated, you can safely choose say a 200-ton hydraulic press for a wide variety of work.

There is another aspect to press selection. Most hydraulic presses are not stock items. You can get what you need in respect to tooling space and tonnage. You are free to look over your jobs and dies, determine the right-to-left and the front-to-back dimensions and shut height that will accommodate all of your jobs (if a small shop) or a group of jobs (if you have a larger plant). Then you have the press built with the features that you need.

Reduced setup time

Stroke and pressure adjustments of a hydraulic press can be made in a few minutes. You can duplicate settings that proved satisfactory when the job was run previously. You do not need the services of a man skilled in adjusting pitman connections by the cut-and-try process.

After the initial adjustments are made, the press can be started up cold and good pieces produced immediately. This saves time and material, especially when drawing and forming materials like stainless, where the blankholder pressure is critical. Further, the scrap costs and production time for small lots are reduced.

If your dies are made to JIC standards, they will be interchangeable in respect to mounting on mechanical presses made to the same specifications. Tentative JIC specifications for hydraulic presses are now before the industry, and already some presses are being built to them.

More pieces per day

Two features of the hydraulic press help you to make more pieces per day. As you know, the speed and pressure of the ram of a mechanical press are changing constantly during the downstroke. At or near the bottom of the stroke these conditions may be out of balance with the drawing or forming necessities of the job. Hence, you may be forced to cut back on strokes per minute by changing the drive. In the hydraulic press, the maximum preset pressure is available throughout the stroke, and the speed can be adjusted as desired by use of a handwheel. Stroke, timing and pressure are thus more easily matched to job requirements. Thus, you are likely to get a faster production rate than is possible from a mechanical press.

We are talking, of course, about presses intended for forming and drawing. A hydraulic press is not intended to compete with a high-speed crank press or dieing machine, although the fluid-powered machine is used in some shops for blanking and piercing along with drawing and forming. But in its proper field, the hydraulic press is not slow. Modern presses in the intermediate and larger sizes are as fast or faster than mechanical presses, in terms of strokes per minute.

Work quality

Good die design and diemaking play major roles in producing high-quality work. But drawing speed and how this speed fluctuates during the actual work cycle play a part in producing good or bad work. Pressure characteristics of the hydraulic press are favorable to making a higher percentage of parts without tearing or other defects.

Uniform wall thickness of drawn work is a desirable quality, and in some cases it is essential. Example: a deep-drawn tub that must have good static balance. Here a hydraulic press was found necessary, because mechanical presses in the shop could not produce work with close tolerances on wall thickness.

The ability to start up on short-run work and make good pieces from the beginning is important

presses?

in jobbing shops. Blank-holding pressure as well as drawing-slide pressure can be set quickly to suitable values and even more quickly if values recorded from a previous run are used. This feature of the hydraulic press reduces scrap costs, which otherwise might be an appreciable percentage of total production cost for a short run.

Versatility

It is obvious that hydraulic presses possess a high measure of versatility, considering their ability to long stroke or short stroke and to change drawing speed or pressure. However, have you considered other possibilities?

One is that a triple-action press can be operated in several ways according to your work requirements: (1) with all three actions, (2) with the blankholder slide locked to the drawing slide and the third member acting as a cushion or as a positive upward thrusting member, and (3) with the action provided with a delayed return of the cushion to lift the piece out of the die.

A second possibility is that of making two draws in one stroke. In the first part of platen travel, a cup is drawn; in the remainder of the stroke the plunger, or outer slide, pushes the cup down over a mandrel, turns it inside out and reduces its diameter.

Die design and die wear

Exact control of pressure for the job to be done means that you do not have to design dies primarily on the basis of press tonnage. In other words, if the job should take 150 tons and your press has a 500-ton rating, you can design the dies for 150 tons rather than 500 tons. Thus, quality and cost of dies are related to job tonnage, not press tonnage. Often you will find that Kirksite, impregnated wood or plastic die members will suit your production needs, and you won't have to make iron or steel dies through fear of a smashup. Also you need not fear smashups if an extra-thick blank or a double feed occurs. If the preset tonnage is exceeded, the press stops.

Die wear and breakage are produced by the shock of the upper die striking the lower die at high speed and pressure. In the hydraulic press, the platen advances at high speed, then the speed change control reduces the speed to that suitable for pressing before contacting the work. Shock on dies is reduced.

Maintenance

There is little that can go wrong or wear out on a hydraulic press. The leakage problem of years ago has been solved by better machining and sealing members. If proper care is taken to tighten up connecting bolts in the piping system upon installation of the press, there should be no leakage.

Your spare parts inventory can be small. The chief item is hydraulic packing, which is not replaced often. Other parts are minor components of electrical and valve units, chiefly springs and balls.

Equipment and operating costs

In smaller sizes, hydraulic presses may cost more than mechanical presses; in large sizes they may cost less. Generally speaking, motors are larger in order to move the hydraulic oil in a relatively short time interval. However, power costs are offset by savings in other directions—reduced maintenance, scrap parts, etc.

Select your press by general type...
...know your press characteristics

Hydraulic presses for metal-forming work are almost always of the downstroke type. Upstroke and horizontal stroke presses, used for coining, die casting, extrusion, forging and other work, will not be considered.

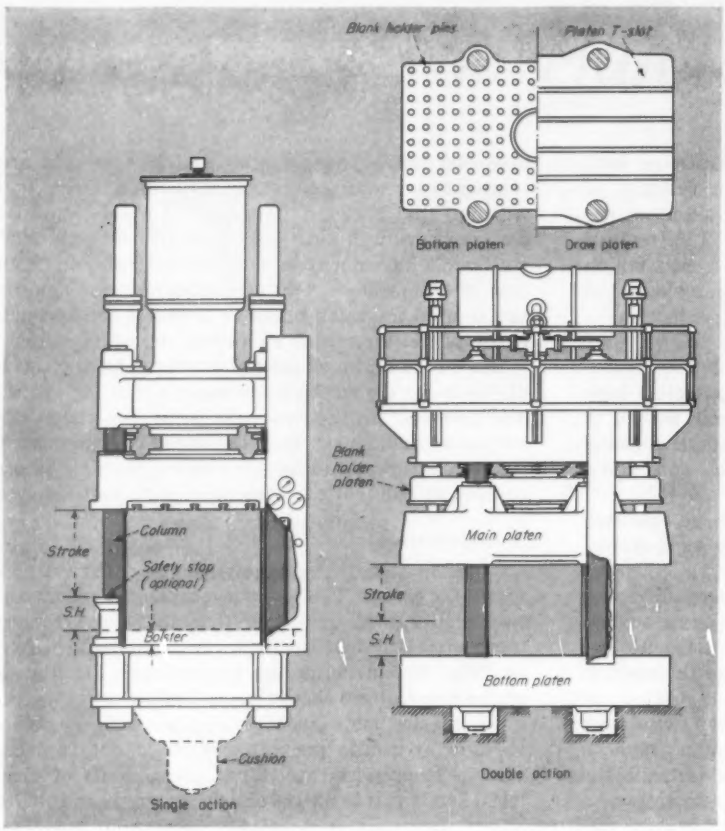
There are three elements in classification of downstroke hydraulic presses:

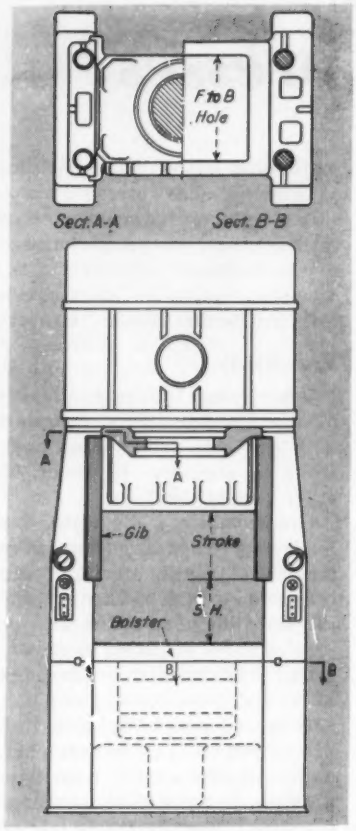
1. General type, by tension member and frame design.
2. Pressing action such as single, double or triple, with or without cushions, as required.
3. Type of control.

PRESS TYPES

This designation is derived from the type of tension member and frame design of the basic press. The tension and frame members are, of course, those elements which position and retain the top and bottom platens. Six types of frame construction have various degrees of use in metal forming work. (next page).

General types of hydraulic presses...





ROD OR COLUMN . . .

This type of press is much used for work requiring rubber pads and hard punches. However, it is also used for drawing with hard dies, for redrawing, coining, blanking, piercing, notching, etc. Strip or blank feeders might be used with the press. Generally speaking, the column type of press is not used where high production rates and extreme accuracy of guiding are required. Presses with single, double or triple actions may be obtained, each with or without a cushion in the bed.

The distinguishing characteristic of a column press is, of course the use of the columns or tension rods to position and retain the top and bottom platens and to serve as guides for the moving platen. In this type of press, there cannot be said to be a "frame" in the usual sense of the word. Metalworking presses generally have four columns, although two-column, four-column and multiple columns are used. Columns are usually round. They are inserted through holes bored in the platens, usually at or near the four corners. In heavy tonnage presses, the columns are not only threaded at their ends for retaining nuts, but also below the top platen, where inserts or collars are applied to support the weight of that platen. Lighter tonnage presses support the top platen on shouldered columns, the diameters of which are reduced to pass through that platen.

The moving platen is bored out at each corner to suit its bushings, which guide the platen on the columns.

The platens are made of cast steel or a weldment. For small presses a solid slab of steel or cast iron is sometimes used.

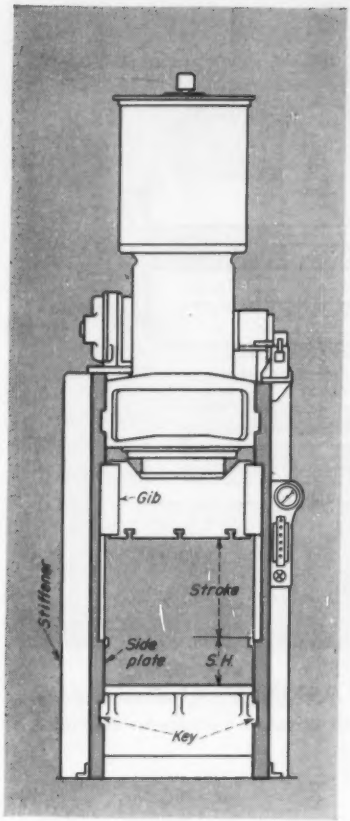
Column presses are used where accessibility from all four sides is important, a wide variety of jobs must be run, or when low investment is a consideration.

SIDE-HOUSING . . .

In this design the platens are separated by rigid box-type members that inclose tension rods and support the platens. Thus, there are both tension members and a frame. The ends of the housings are arranged with keys, front to back and right to left, to prevent lateral movement between the housings and platens. Housings have angular wearing surfaces on the inside corners to guide the moving platen.

Because of the design features set forth, the side-housing press is best suited and most popular for high-speed production work where high accuracy in guiding is needed. The gib guides on the moving platens are adjustable for accurate alignment with respect to parallel travel of the moving platen.

Side-housing presses are made in single-, double- and triple-action types. They are used for forming and deep drawing in closed dies.

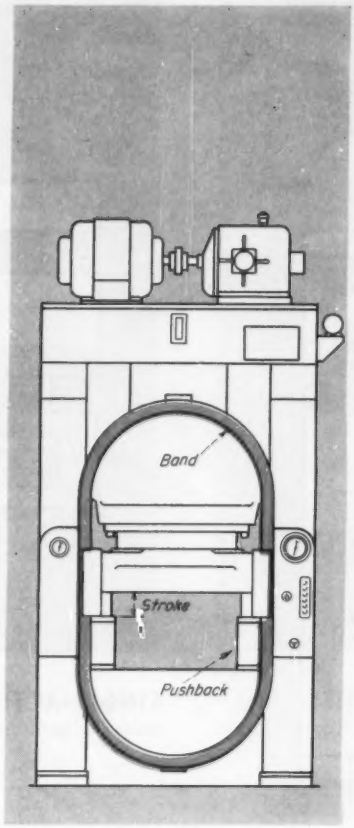


SIDE-PLATE . . .

In this and the two following general types, the tension members and frame are one and the same. In the side-plate type, heavy steel plates or weldments are keyed and rigidly bolted to the top and bottom platens. Inside edges of the plates are machined with angular surfaces for guiding the moving platen. This type of press is used where medium accuracy is required and where the stroke is not too long. This design is satisfactory where the daylight is not great, because there is a tendency for the side plates to bend unless heavily reinforced by welded-on ribs.

Because the side-plate frame has no columns, it is a more economical type to build. The lower platen is keyed to the side plates and may have a through hole.

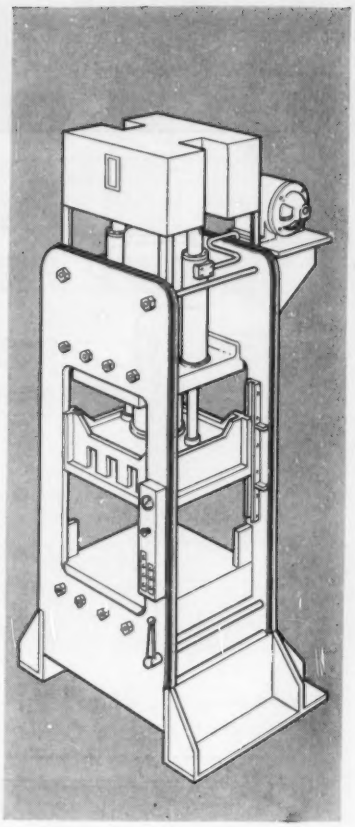
Side plate presses are used for straightening castings and other miscellaneous work. These are usually single action only or with cushions.



BAND-TYPE . . .

Principal frame component of this type of press is a loop with a platen inserted in the bottom. Usual construction involves a loop made of two formed heavy plates welded together to provide tension members, although sometimes the loop, cylinder and platen are cast in one piece. Only the single-action type of press is available, because the machine is intended for short-stroke, high-tonnage work like coining and embossing. The machine has given a good account of itself, for example, in the coining of jet-engine blades to size. Other uses are the hubbing of dies.

Band-type frames are made in the upstroke type for such purposes as die hubbing and in the downstroke type for coining. A 1000-ton press of the latter kind might have a 7 in. stroke. In this case, the press was built for full-automatic operation. It had an approach speed of 350 ipm and a pressing speed of 14 ipm.



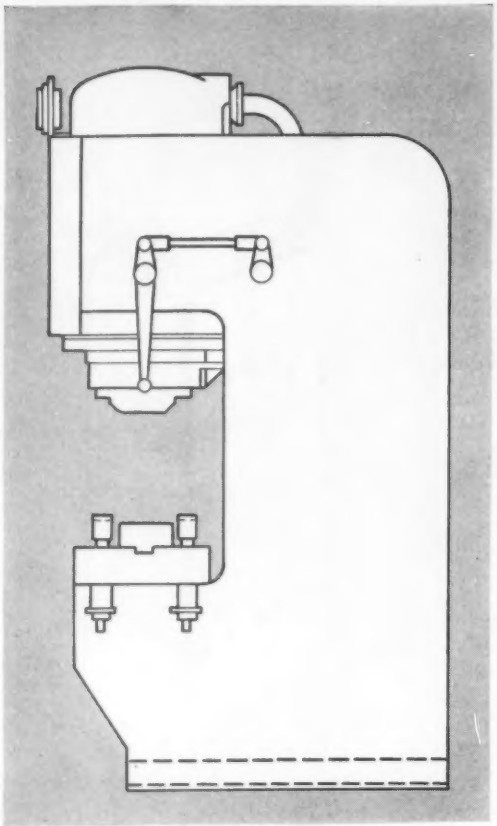
FRONT AND BACK PLATE . . .

Low cost, low-tonnage presses with the dies accessible from all four sides are produced by using tension members in plate form at front and back of the machine. The plates are cut out at the center. Top and bottom platens bear against the cutout edges of the plates and are held in place with bolts. The moving platen is suitably guided by adjustable gibs. Operations performed are drawing, forming, bending, coining, etc. Pullback cylinders return the moving platen to the up position. Press is built in single-action style, or single action with hydro-pneumatic die cushion for deep drawing.

The main cylinder and top platen are cast integrally with the two side pull-back cylinders

Presses can be had with single-action normal speed with or without cushion, and in same options with high-speed operation.

PLEASE TURN PAGE



GAP TYPE . . .

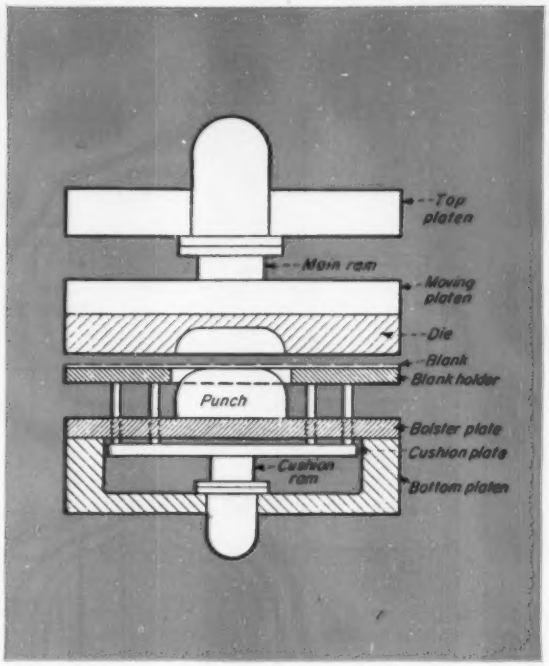
Most gap-frame presses are used for other purposes than metal-forming—straightening, bending, crimping and the like. However, suitable presses with the familiar C-shaped frame are built specially for forming and trimming operations. Advantage of the frame style is: long work can be put into the press from the front without interference of housings or columns.

To recapitulate, the best type of press for high-speed, long-run production on sheet metal, where accuracy is required, is the side-housing press with automatic controls. The press can have single action with cushion, double action or triple action, depending on the type of work to be done.

For small and medium work where the draws are short and production per hour is not great, the side plate or the front and back plate types can be used, also column types.

For large draws and short runs, the double-platen column type is ideal, because almost any type of draw can be made with inexpensive dies. Only a short time is required to change from one setup to another.

Where forging or other hot work is to be done, column- or housing-type presses can be used with a semi-accumulator pressure supply, if the pressure stroke is not too long; otherwise a full accumulator system should be used.



SINGLE-ACTION PRESSES . . . can be fitted with a cushion so that blankholder pressure is available for deep drawing

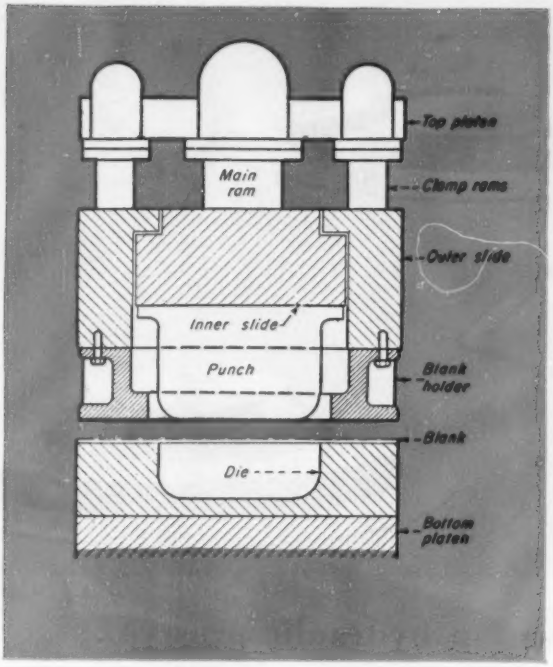
Press

Press actions are: (1) single action, (2) double action, and (3) triple action, each with or without cushion. This terminology is often confused with the type of work drawn. For example, a double-action draw operation (i.e. where the edges of the blank are held) can be done on a single-action press with a cushion.

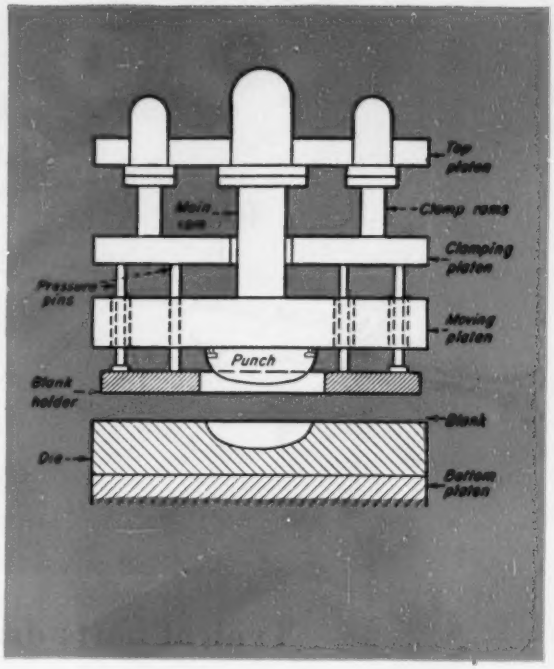
A single-action press has one moving platen or slide member. A single-action press with built-in hydro-pneumatic cushion in the bed can be used for draw work (as described above) by using a cushion cylinder that supports a blankholder ring by means of pins.

In a double-action press, a ram exerts pressure on the platen or slide carrying the punch, while another set of rams exerts pressure on a separate platen or slide carrying the blankholder rings on same side of the work. Both actions are downward.

The most commonly used double-action press is the side-housing type with an inside slide for the punch and an outside slide for the blankholder. The inside slide is operated by a double-acting piston and the outside slide by four single-acting cylinders. Return of both slides is accomplished by the return area of the piston. The inside slide is pulled upward, picking up the outside slide near the top of its stroke.



DOUBLE-ACTION PRESS ... (side-housing type) applies pressure to blankholder by outer slide



DOUBLE-PLATEN PRESS ... (usually column type) employs upper platen to apply pressure to blankholder

actions...

A cushion in the bed is often used to clamp the sheet against the punch. The cushion is also used as a blankholder on small work to avoid bridging in the blankholder ring.

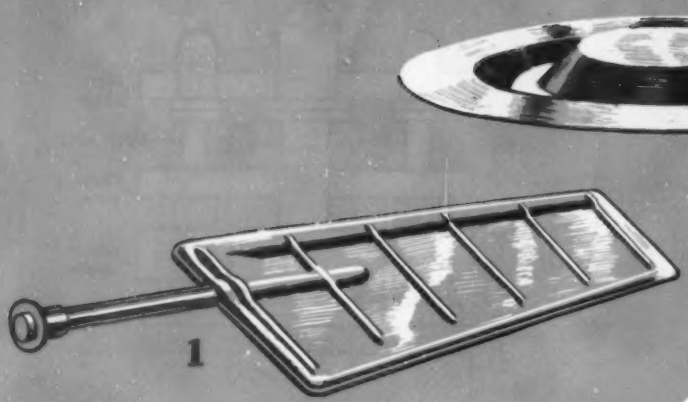
Another form of double-action press (usually a column type) is the double-platen type. Here there are two platens one above the other, the upper one to supply pressure to the blankholder and the lower one for the punch. The blankholder ring is suspended by means of blankholder pins that pass up through the punch platen and bear against the under side of the clamp platen. The punch platen is operated by one central ram that passes through a hole in the clamp platen. The latter is actuated by four rams near the corners.

The lower platen is drilled with a series of pin holes except at the center. This makes the double platen press flexible for short runs where there are many die setups. With the large number of pin holes it is easy to locate blankholder pins for almost any shape of blankholder ring. This type of double-action press is universally used in aircraft plants, jobbing shops and others where the variety of parts is large and the quantity of each is limited.

A variation of the double-action, double-platen press is one with the blankholder platen below the punch platen. Here the main ram actuates the punch platen. The lower blankholder platen is held down by four clamping cylinders mounted in the main platen. When the blankholder contacts the work, further movement of the upper platen causes pressure to be built up in the blankholder cylinders. The tonnage of the blankholder cylinders is deducted from the main ram tonnage to obtain the net pressure available on the punch.

With this design it is necessary to make the blankholder platen heavy to avoid deflection. It also limits the size of punch, which has to be fastened to the moving platen through a hole in the clamping platen. Some double-action presses are arranged with an upward-actng cylinder and platen in the bed to achieve a triple action. Such cylinders can be arranged so that they can be used as blankholders. The cushion ram is usually returned to the top of its stroke by air pressure in a hydro-pneumatic reservoir.

For triple-action operation, hydraulic pressure is supplied to the cushion cylinder to force its slide upward. This method is used to make a reverse draw in the bottom of the work after the upper rams have performed the main draw. The cushion may also be used to serve as a high-pressure ejector.



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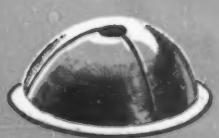

4

Typical parts drawn on hydraulic presses...

1..Cooling-tower fan-blade assembly. The 1000-ton column type press also produces stainless casket parts

2..Domed water-heater part (⅛-in. steel). Two men operate 800-ton side housing press

3..Another water-heater part. Production rate, 237 pc per hr

4..King-bolt liner blanked, drawn and coined on 500-ton press; 0.134 in. brass

5..Steel cover 35 in. long, 26 in. wide, 7/32 in. thick, blanked and drawn with 1200 tons pressure

6..Water-heater part. Production rate, 259 pc per hour

7..Wheel-house stamping (made double) is 14 in. draw in 0.050 in. steel. Size, 22 × 39 in. Clamping pressure, 165 tons; drawing pressure, 500 tons. Weight, 25 lb.

8..Front cowl, 40 × 46½ in., made double, 10½-in. draw in 0.035-in steel. 800-ton press

9..Grille cap for tractor is drawn double from 26 × 39-in. blank at 300 pc per hr. Stock is 20 ga

10..Section of tractor gas tank produced on 400-ton double-action, side-housing press

11..Flexibility of use is proved by a press that draws bathtubs part of the time and also is used for heading 105-mm shell cases

12..Tractor seats are drawn on the same 400-ton press after quick die change

13..Top roll for gas stove is deep drawn on 500-ton side housing press

14..Center pillar for automobile requires even pressure and constant drawing speed. Depth, 6½ in.; 1000-ton press

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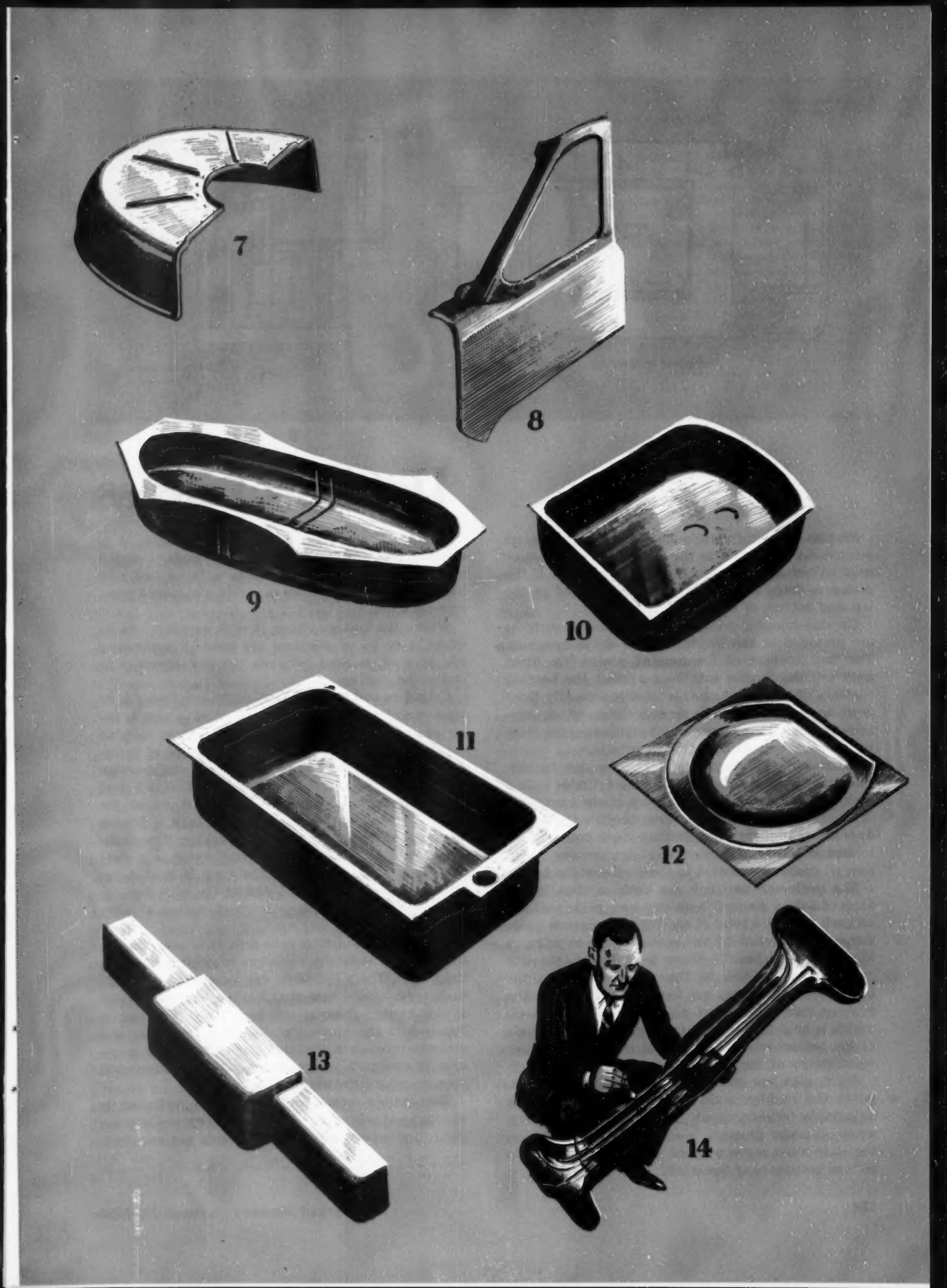
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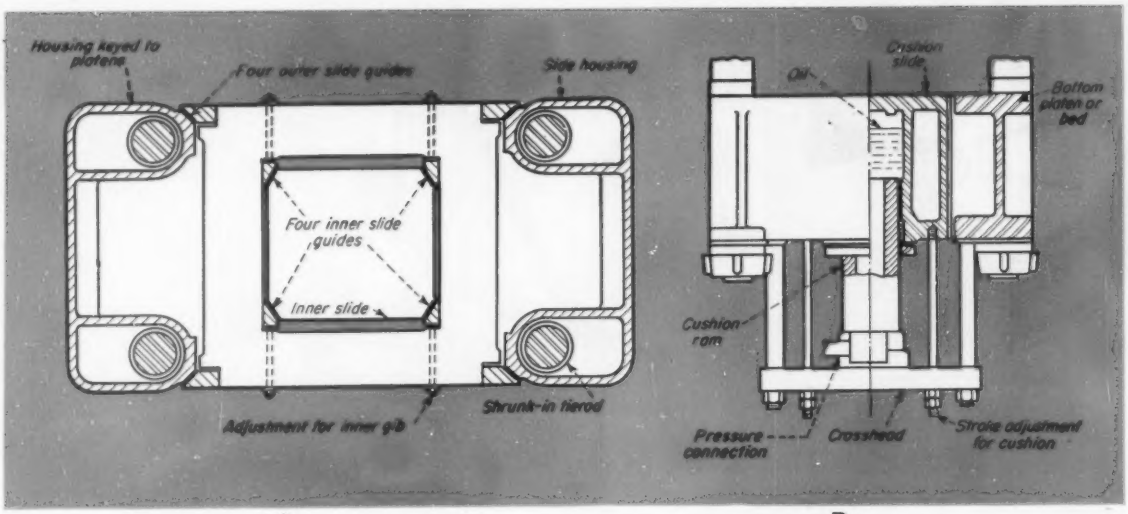


Details of press

Platens. Moving platens on column-type presses are usually bored out at the four corners to receive split half-round bushings having oil grooves. If the platen is deep, a set of bushings is inserted at the top and bottom of each bore.

On side-housing presses angular finished surfaces are provided at the inside corners of the housings. The four corners of the moving platen are fitted with adjustable gibs that bear against the bearing surfaces of the housings. Gib faces are usually lined with bronze strips. The inner slides of double-action presses are arranged with similar guides. Here the gibs are adjustable from the outside.

Cushions. On column-type presses the cushion sometimes consists of an underslung cylinder with a cushion plate arranged on the top of the ram. This is satisfactory for center loading, because the design does not permit rigid up-guiding. Such construction is used mostly on large double-platen presses, where a small cushion is needed in the center of the bed.

The preferred design has a cushion slide in the form of a deep member with two long guide surfaces on each side, or a total of eight guides. Bronze guide strips are fastened to the inside of the opening in the bottom platen. If there is sufficient room, a cylinder is inserted in the slide; otherwise the cushion slide is bored out to act as a cylinder. The cushion ram is fixed on an underslung crosshead, which is held by the rods fastened to the underside of the bottom platen. Additional rods limit the upward stroke of the slide.

Eight gibs are provided in the bed opening to guide the cushion slide. Stroke of the cushion is adjustable (seldom used). The ram is fixed; hence, when oil under pressure is admitted to the cylinder, the slide must move upward until arrested by stop rods or resistance of the work.

Instead of the slide acting as a cylinder, it is common practice to use a separate cylinder inserted in the cushion slide. Sometimes a large bed will have two or more cushions to obtain a balanced pressure condition.

Where the bottom platen is wide compared to its depth, a series of cushions are used. A separating rib or wall, is used between the bed openings to stiffen the casting.

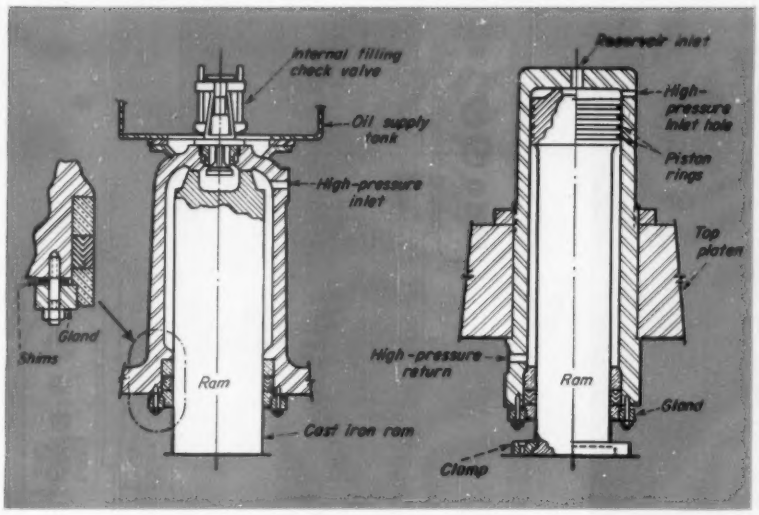
Cylinders and Rams.* Essentially, a cylinder is an open-ended pressure vessel into which a ram is inserted and sealed against loss of pressure by suitable packing held in place by a gland. Designs of cylinders differ with use. The simplest is the single-action type with action in one direction only. This is a steel casting or forging, which is necked down at the throat. The throat is machined to take a bronze bushing and has a recess for the packing. The packing is held in place by the gland which is a steel ring with a bronze liner. The ring is held down by studs threaded into the end of the cylinder.

The ram is usually a cylindrical casting of alloy cast iron or a steel forging.

With one-way action cylinders, it is necessary to use separate auxiliary cylinders to return the moving platen. These cylinders are usually of the pull-back type with a ram that has a smaller diameter at the bottom than at the top. The lower end is fastened to the moving platen and the upper end projects through a packing gland. Hydraulic pressure is admitted to the under side, or differential area, to return the moving platen.

The double-action, or piston-type, cylinder is widely used where the moving weights are not too great, and where high returns speeds are required.

*The word "ram" is used here to describe a hydraulically actuated press ram.



C D

ACCURATE GUIDING surfaces are provided for inner and outer slides of double-action, side-housing presses (*A*). Gibs provide for take-up of wear. Cushion (*B*) in bottom platen or bed is actuated by high-pressure oil supply in case of a triple-action press, and cushion action is controlled from instrument panel. Single-acting cylinder and ram assemblies (*C*) have an oil reservoir and a quick prefill valve that admits oil rapidly. At proper point in down travel of the ram, the valve is closed and high-pressure oil is admitted for the pressing part of the cycle. The arrangement contributes to high-speed operation. Direct-acting cylinder and ram assemblies (*D*) are mostly used on high-speed, side-housing presses

construction...

The ram in this case has a piston head somewhat larger than the ram or piston rod. This head has circular machined grooves into which are fitted metallic piston rings to seal off the pressure between the top and the under side of the piston head. The cylinder is bored out straight and the piston with its rings in the head are lapped in assembly to insure a perfect seal. If this is not done the ram will drift downwards because of the oil leaking past the rings from the under side to the top of the head.

In operating the press, pressure is admitted to the top of the cylinder for the pressure stroke and to the differential area under the head for the return stroke. The piston rod is sealed by packing and a gland.

This double-acting piston is used mostly on high-speed, side-housing presses.

Packing is a very important item. The chevron type has been found to be the most effective. This is a series of inverted V-rings with suitable adapters top and bottom to fit the face of gland and the bottom of packing recess in the cylinder. Sealing is obtained under low as well as high pressure.

MOUNTING OF DIES

On column-type presses, the bottom platen or bed is arranged with T-slots without a bolster plate, except where a cushion is used. The moving platen usually has T-slots also. This is always true on large double-platen presses.

On side-housing presses the bottom platen carries a heavy bolster plate which is arranged either with a pattern of tapped holes as a means of holding the dies or has machined T-slots. The moving platen is often arranged with a similar type of bolster, but often the upper die or punch is fastened directly to the platen.

Knockouts are often provided in the moving platen. These are bars which pass through the platen and are actuated by rods on the outside. They contact the under side of the top platen on the return stroke.

MAINTENANCE OF HYDRAULIC PRESSES

Hydraulic presses have few moving parts, except for the pump and some of the valves. Oil moving through the pipes takes the place of mechanical motions subject to wear and breakage. The oil not only functions as a pressure medium, but also internally lubricates all of the pumps and valves.

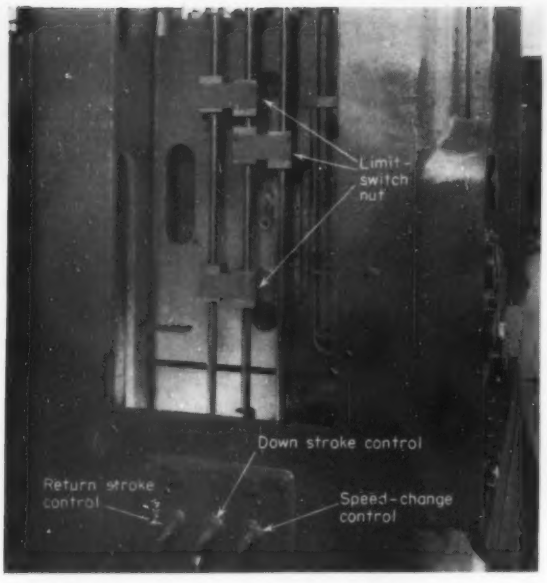
It is necessary that the hydraulic oil be kept clean, because small particles of dirt will cause the valves to stick and the pumps to have undue wear. When adding oil to the system, use clean containers and pass the fluid through a fine strainer.

No definite rule can be laid down about frequency of changing the hydraulic oil. Much depends upon climate and operating temperature. One shop may be forced to change oil once a year, whereas another will find a 2- to 3-yr interval to be satisfactory. Hydraulic presses are supplied with oil filters.

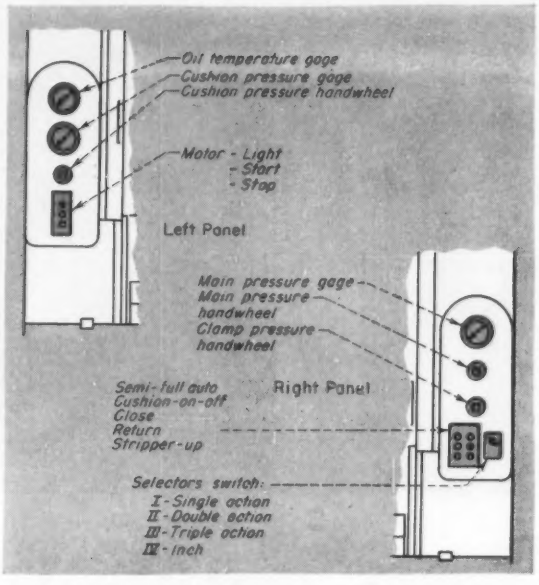
There has been some criticism about leaks on hydraulic presses. However, this is largely due to experiences with early designs of presses, and has been overcome in present-day designs. If proper care is taken to tighten up the connecting bolts when a press is installed there will be no leakage.

The gib guides on the moving platen should be checked periodicaly to see that there is equal and sufficient clearance.

Your spare parts inventory can be small. The chief item is hydraulic packing, which is not replaced often. Other items are minor components of electrical and valve units, chiefly springs and balls.



STROKE CONTROLS limit the upstroke and the downstroke to suit the work, thereby saving time in the press cycle. A nut on each screw carries a limit switch tripped by moving platen



PUSHBUTTONS AND HANDWHEELS control hydraulic presses. Complete flexibility in type of operation, pressure and stroke provides optimum drawing or forming conditions, plus reproducible results

Pressure supply and controls

Various means are used to supply pressure to a press depending upon operational requirements. These methods are classified as self-contained, semi-accumulator operated, and accumulator operated.

Self-Contained Presses. Most presses for forming metal are arranged with pumps that pump oil directly into the various cylinders. The pressing speed (under full tonnage) is directly proportional to the total delivery of the pumps, which may be radial-piston, axial-piston or radial-vane types.

PRESS CONTROLS

Except for straightening or forming presses, push-button control is generally used on metal-working hydraulic presses. The control panels are usually mounted at the front of the press. On side-housing presses, the housings are cored to receive control panels. The following controls are included:

Motor "start" and "stop" buttons
Selector switches for manual or semi-automatic operation
Close and return buttons for press operation
Hydraulic pressure gages

In addition to the controls mentioned, it is necessary to have stroke controls. These are "down stroke," "return stroke" and "speed change" controls. One design of these controls uses long threaded screws which carry a nut arranged with a limit switch. The moving platen has projecting arms which, as the platen moves up and down, operate the limit switches. Positions of the switches are adjusted by turning the screws by means of a small crank handle through bevel gears.

With these stroke controls it is possible to limit the upstroke and the downstroke to suit the work, thereby saving press cycle time. The speed change control changes the speed of the rams from fast approach to pressing speed before contacting the work.

PRESS OPERATION

As a typical example of machine operation, let us take a side-housing, double-slide, triple-action press. This has controls mounted on panels to the right and left.

On the left panel are "start" and "stop" buttons for the motor, oil-temperature gage and cushion-pressure gage. There is also a handwheel for adjusting the pressure of the triple action to the desired amount.

On the right panel are the main ram pressure gage, a pressure control handwheel for each clamping ram and one for the main rams. At the lower part of the panel is a selector switch to obtain the action desired. Two additional selector switches control use of cushions and choice of single cycle or continuous cycle operations. The other three buttons are for actuating the motion of the press.

This control arrangement allows complete flexibility in the operation of the press. After the die has been set, the operator first selects the type of operation dsired, i.e. either single, double or triple action by means of the main selector switch. As an alternate, the bottom cylinder can be used as a cushion with single and double action.

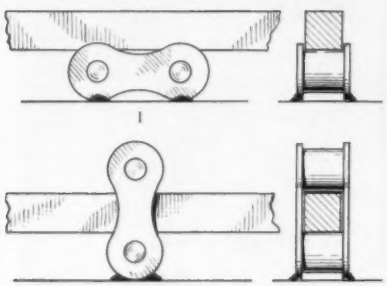
The other selector switch is set for semi-automatic (single cycle) or full automatic (continuous cycle) operation.

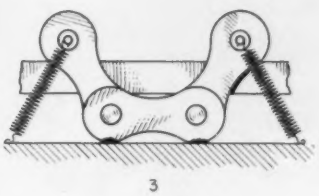
The maximum pressures required are set by the pressure control handwheels.

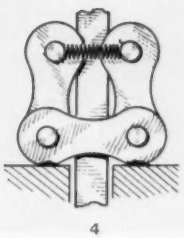
The stroke controls are adjusted to suit the draw.

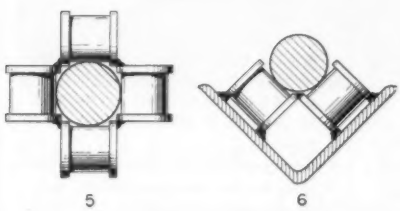
Approach and return speeds are usually ten times the pressing speeds.

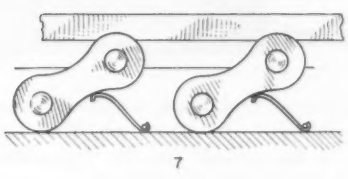
Practical Ideas

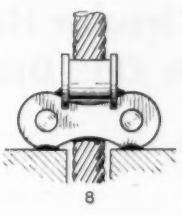












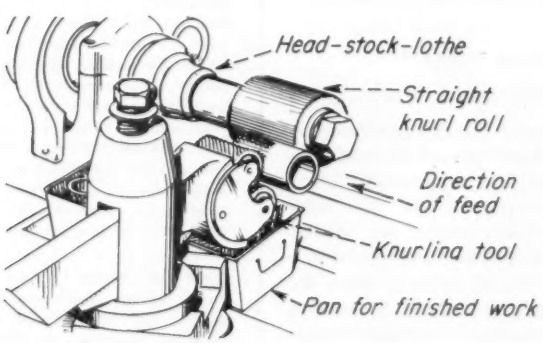
Roller-Chain Links For Odd Jobs

Roller-chain links can serve a variety of odd purposes in the small shop, particularly as guide rollers for feeding stock, guiding wire cable, and other similar uses.

Some of the applications are shown above. 1 shows how single links can guide a square bar. The links are tacked to the table by welding. 2 is a similar arrangement where the link is upright and guides the bar on top and bottom.

3 and 4 show how to use three links, spring-loaded, to assure bar-to-roller contact and vibration.

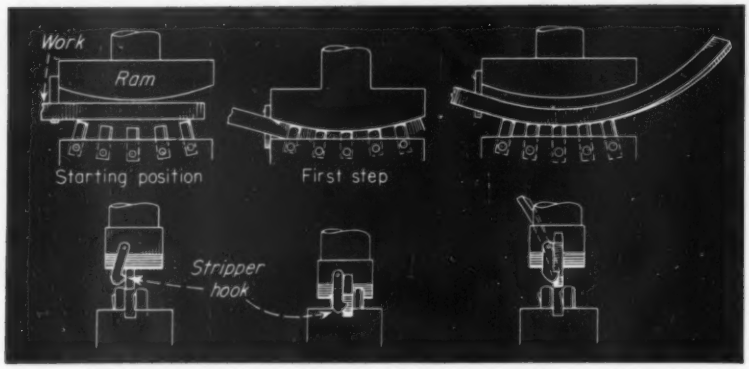
5 and 6 show chain links guiding a round bar. 7 shows a series of links, pivoted at one center, and spring-loaded, to accommodate bars which are not perfectly straight. 8 is a way to guide a wire cable, where two single links are crossed and tack-welded. *Haim Murro, Bayonne, NJ*



"Centerless" Knurling Saves Parts

We had made a large number of brass bushings ¼-in. diameter, ½-in. long, and found that the workpieces which the bushings were to fit had been made 0.001 in. ID larger than the bushings.

Time was short, and we couldn't make new parts or bushings, so we decided to knurl the bushings. We could not hold the bushings in a collet, so we made a "centerless" knurling setup by mounting a straight knurl roll on a ¼-in. shaft held in the collet of a lathe. By setting a standard knurling toolholder on center in the toolpost, and with the lathe running forward, it was a simple matter to feed the bushings into the knurlers, which, in turn, fed the parts toward the headstock. When knurling was done, the parts fell into a pan under the headstock end of the toolpost. (*Name unknown*) *Jersey City, NJ*



Circular Helix Formed In One Die Operation

The die shown was originally designed to produce a few pilot pieces of a steel strip which was to be formed into a circular helix. We intended to make the shape by forming the circle with two dies, and form the helix with power rolls. As it turned out, the setup shown was so satisfactory that the dies and power rolls were discarded. With the present method we have saved one operation.

We figured that about one-sixth of the circle could be made at one time, and built the die with that in mind. Calculating the helix required for that part of the circle, we drilled the die block for the pins. Starting at the center we put in vertical pins and graduated the angle of the succeeding pins outward both ways until the outer pins had the required helix for the part of the circle we were making. The holes for the pins were tangent, and the pins were ground flat, with about 0.010 in. clearance. We put a slight float in the pins, to make easier removal of stock. The proper radius was milled into the block, just wide enough for the helix. The ram was made with a radius equal to the ID of the work.

Although the first pieces did not come out exactly as required, a slight rework of ram radius and pin width gave satisfactory results. This was not a precision job, but the pieces are usable in production.

In operation, the work is fed across the die from left to right, with the first step to place the piece across the full width of the die. After the first forming, the work is advanced so that half of the formed portion is struck again. This is continued until the circle is complete. *John Muth, Lansing, Mich*

Ed note: Although the unformed part of the work was held by hand until the ram started to force the end upward, in this particular job, we would suggest that anyone using this idea should put together a makeshift holding device to support the unformed part of the work.

Starter-Motor Parts Aid Experimental Work

We do quite a bit of experimental work for local inventors and experimenters, and occasionally need an overrunning clutch. We used to make the clutches as we needed them, but found that this was much more easily and cheaply done by buying the clutch used in certain popular automobiles in the starter mechanism.

The assemblies can be bought at a fraction of their cost to make, and spare parts and replacements are easily and quickly obtained. *H Koslow, Bronx, NY*

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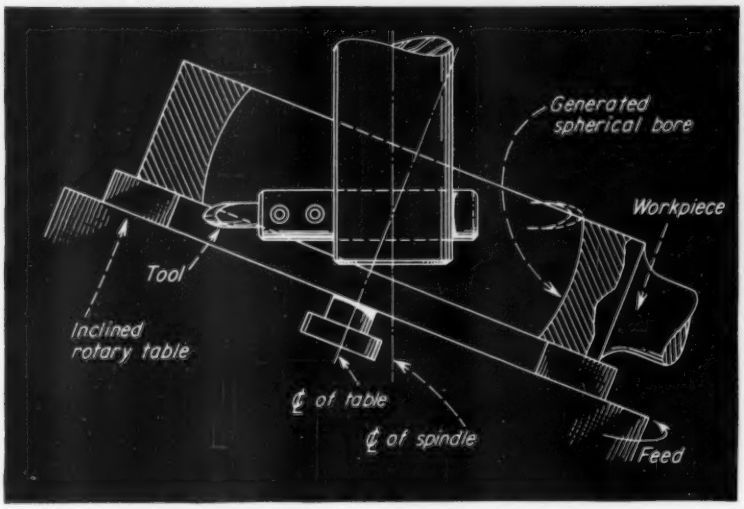
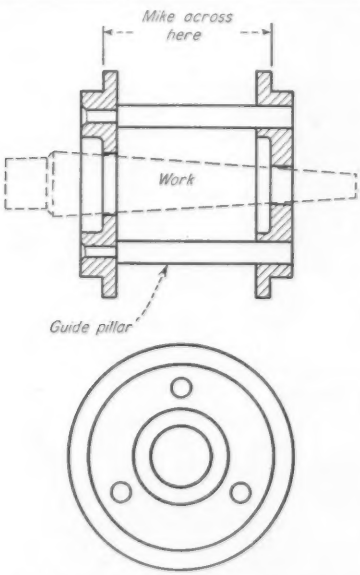


Single-Point Tool Mills Spherical Bore

Spherical bores are easily milled or jig-bored with this simple setup. All that is needed is a universal rotary table for the milling machine or jig-borer and a single-point boring tool.

The work is mounted at an angle which is determined by the thickness of the material. The tool must be set so it clears the sides of the work, as shown. The radius of the sphere is established by the distance from the centerline of the spindle to the tip of the tool.

The surface is generated by rotating the table so the tool cuts in a criss-cross pattern, with one rotation of the work to complete each cut. *J E Harwood, Yorkshire, England*



Guided Rings Check Tapers

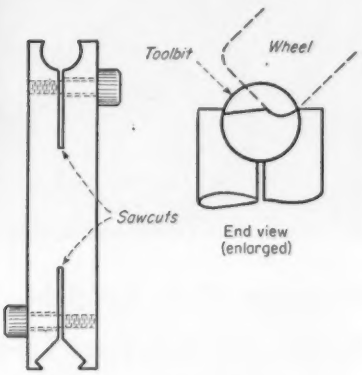
Checking small tapers is made easy and accurate with this gage, which is essentially two guided rings, supported on three equally spaced pillars shouldered at one end.

The gaging ID of the larger ring is 0.800 ± 0.0005 in., and the gaging ID of the smaller ring is 0.400 ± 0.0005 in. The measuring faces of the rings must be flat, parallel, and in exactly the same plane as the base of the recess adjacent to the ID gaging surfaces. The guide holes for the pillars should be drilled and reamed together, by mounting the rings on a stepped plug with OD's of 0.800 and 0.400 in. Pillar holes are a close slip fit.

To find the taper of a workpiece, place the gage on the work, and measure the distance across the measuring faces. This formula gives the angular taper:

$$\tan A = \frac{0.800 - 0.400}{2x}$$

where A is the taper angle, and x is the distance across the faces, *W I Morgan, Somerset, England*

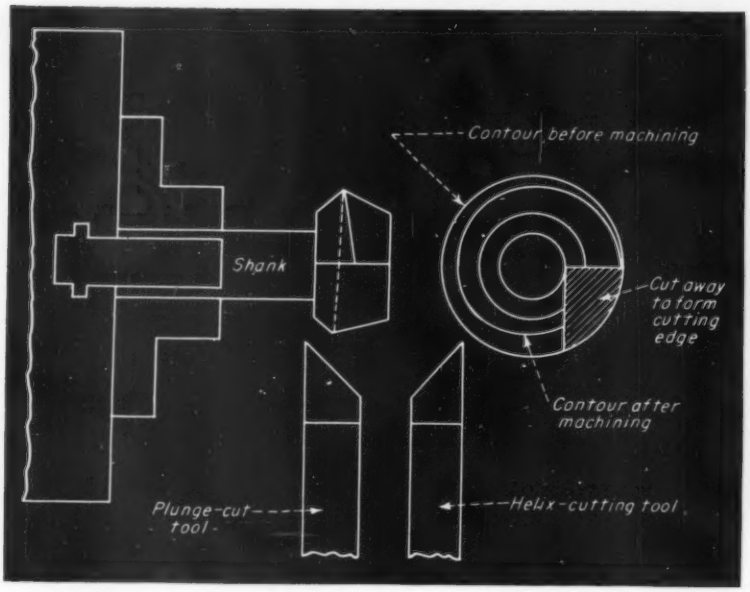


Slotted Toolholder Makes Offhand Grinding Safer

Grinding the tip of a small boring bit can be quite hazardous, especially when grinding with a large wheel. A small holder makes the work safer and more comfortable, and also gives better control of the results.

One end of the holder can be drilled to suit a round toolbit, and the other end can be slotted or shaped to fit the square tool, with excess stock filed away until the recess is just deeper than half the width of the tool. Sawcut, drill, and tap, for clamping. The handle can be knurled, if desired. *T A Fitzgerald, Middlesex, England*

An inexpensive and efficient way to avoid rust on small tools in a toolbox is to cut a piece of camphor (available in any drug store) into small blocks and put a square of the camphor into each drawer of the tool box. Moisture is absorbed and rust prevented. *R Isetts, Kenosha, Wis*



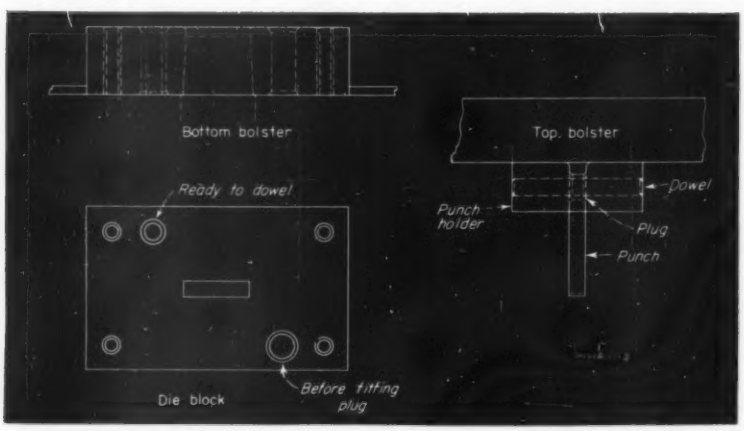
Plunge Cut And Helix Produce Boring Tool

This arrangement will produce a long-lasting boring tool which can be resharpened many times before it is worn out. The tool is made by turning a shank to the required diameter, and then making the cutting surface with a helix and a plunge cut.

The first step in making the cutting part of the tool is to turn the tool body to a diameter somewhat larger than the shank. Then mill out a quadrant of the tool body, as shown. To finish the tool, cut a helix of large pitch with the tool on the right. Then, with the tool on the left, make a plunge cut on the back of the body of the workpiece. This plunge cut will automatically give radial relief by intersecting with the helix. The top edge of the boring tool which results can be ground many times. *Allan Clarke, Lancashire, England*

Laundry Soap Cuts Heat Scale

When hardening drillrod or other tool steel parts by conventional methods, scale is usually formed, leaving the surface of tools pitted and blotchy. To avoid this, preheat the steel to "blue" heat, rub the tool surface with a bar of soap, covering the surface, and continue with heat-treatment. The resulting tool will be clean and free of scale. *Wm Adams, Bayside, NY*



Soft Dowels In Hard Dies Simplify Die Assembly

When making spare die blocks for a presstool, if there is no jig borer available, or if the die block is to be sent to another factory for assembly, this method will be found quite useful:

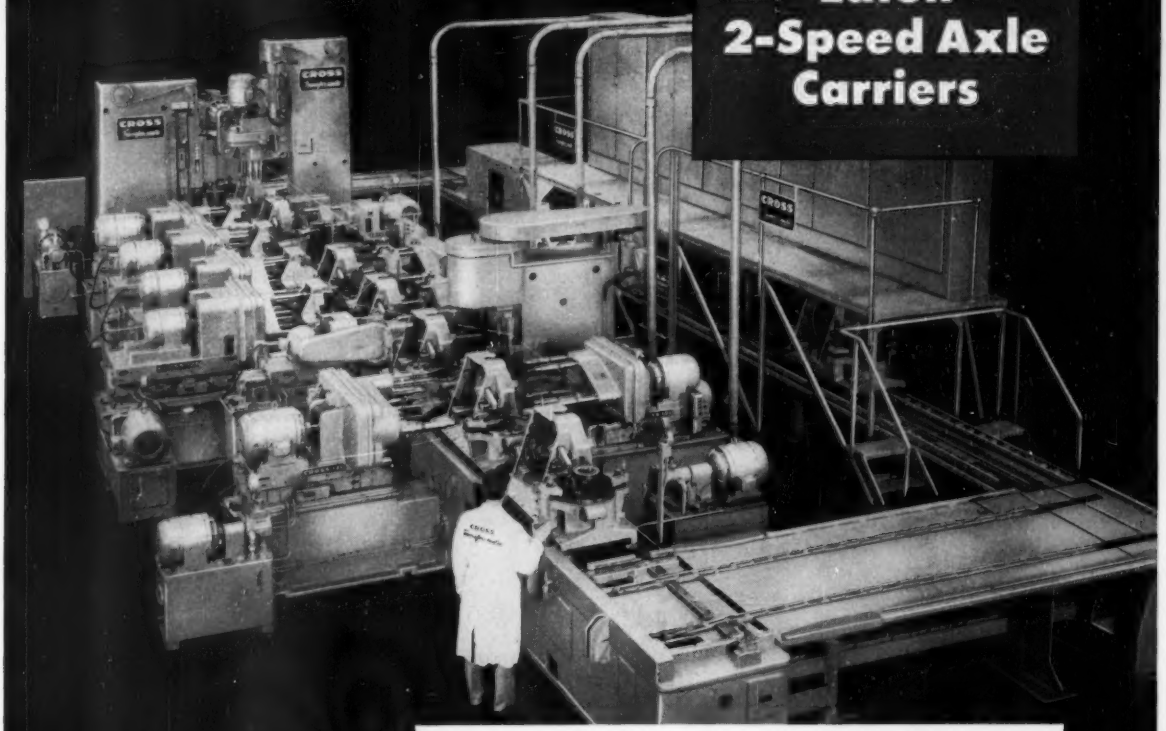
Assume two ¼-in. diameter dowels are to be fitted, as shown. Mark off the holes accurately, and drill and countersink two ⅜-in. holes. After the block has been hardened, drive in a piece of ⅜-in. silver steel and rivet over both ends. The block can then be mated with the old die block, and the dowel holes marked and drilled for a close fit.

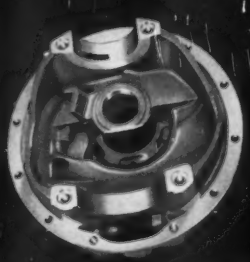
With this method, instead of having to return the whole tool to the toolroom, which can be a time-consuming nuisance if the toolroom is very far away, the spares can be fitted at the place where they are needed.

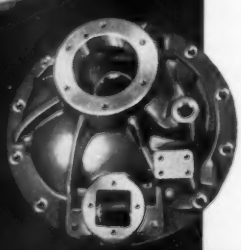
This method can be useful when fitting a punch to a holder, as illustrated. The same principle is used. *P V Dunn, Johannesburg, S Africa*

Another Transfer-matic by Cross

Mills, Drills and Taps Eaton 2-Speed Axle Carriers







- ☆ 53 parts per hour at 100% efficiency—capacity for spiral bevel or hypoid style carriers.
- ☆ 97 operations: 60 drilling, chamfering and reaming; 5 milling; 4 spotfacing and counterboring; 28 tapping.
- ☆ 9 stations: 1 loading, 1 unloading, 7 machining.
- ★ Two-position, progressive type work holding fixtures with automatic transfer from station to station and integral conveyor for automatic return from unloading to loading station.
- ★ Cleaning unit for removing chips from fixtures between unloading and loading station.
- ★ Other features: Complete interchangeability of all standard and special parts for easy maintenance; construction to J.I.C. standards; hardened and ground ways; hydraulic feed and rapid traverse; individual lead screw feed for tapping; coolant system; automatic lubrication.

Established 1898

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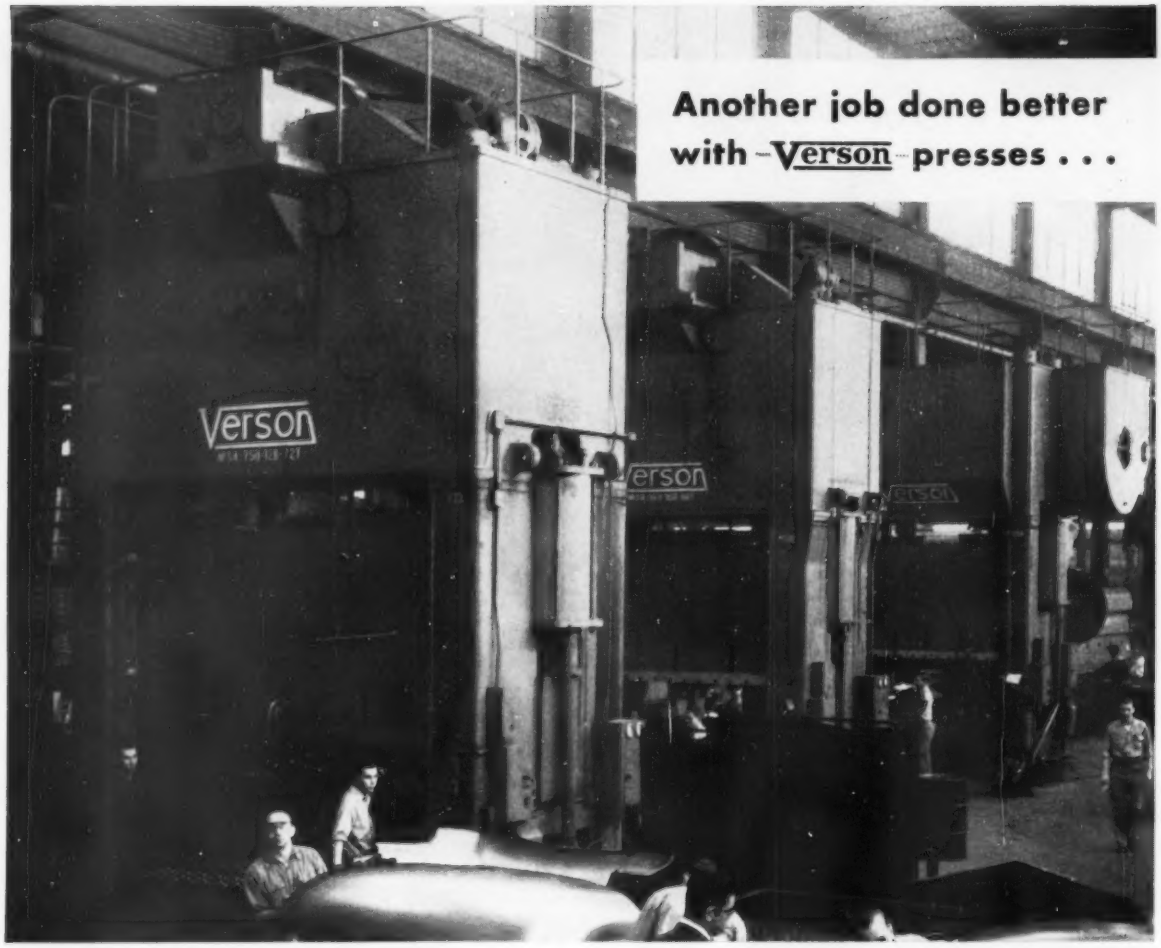

This Verson line-up turns out truck cab tops for Morrison Steel Products, Inc.

Typical of the countless routine jobs that are being done better every day with Verson Presses are the truck cab tops manufactured by Morrison Steel Products, Inc. Buffalo, New York. In the line-up shown above are two Verson four point full eccentrics rated at 750 tons and 400 tons and a Verson two point full eccentric of 750 tons capacity.

Nothing outstanding about this installation?

No, except that like so many manufacturers doing routine jobs, Morrison Steel Products has taken advantage of Verson's high standards of performance and economy. For the manufacturer this means better stampings at lower overall cost. This is proved by experience on all kinds of jobs over a period of a third of a century.

Whatever your press needs, whether the job is routine or one-of-a-kind, it will pay you to put Verson's experience and know-how to work for you. Catalog G-52 summarizes the complete Verson line and gives typical specifications. Write for your copy, today. There is no obligation on your part.

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Corrections for Flat Form Tools

I ZORICH

NOMENCLATURE

C—Step on work diameters $= \frac{d - d_1}{2}$
d—Any work dia for which step on tool is to be corrected
d_1—Smallest work dia (in cases where tool does not reach or pass center of work)
D_x—Tool dia. to be corrected
D—Biggest tool dia
h—Off set of circular tool
H—Gash of circular tool to obtain necessary top rake $= \frac{D}{2} \sin(\alpha + \beta)$
$R—\frac{D}{2}$
p—Tool travel past center
X—Depth of tool to be corrected
α—Top rake angle
β—Clearance angle $\left(\text{For circular tools } \sin\beta = \frac{2h}{D}\right)$

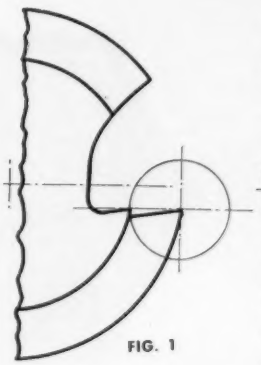


FIG. 1

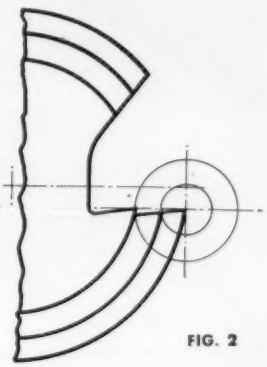
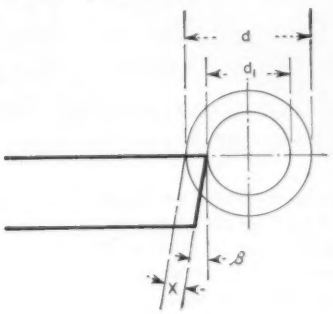


FIG. 2

Corrections for steps on flat and circular form tools must usually be solved by use of several formulas. The accompanying methods reduce this labor, and besides formulas are given for two additional conditions: (1) when the tool reaches center, and (2) when the tool passes center.

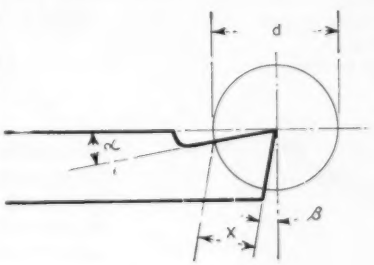
In cases where a top rake tool reaches or passes center at any step, top rake becomes zero or negative. To obtain top rake, tools are ground on steps. If grinding steps correspond with tool steps (Fig. 1), tool steps are calculated with formulas for no top rake. If there are tool steps between grinding steps (Fig. 2), the tool steps between grinding steps should be calculated the same as for a top rake tool.

No Top Rake



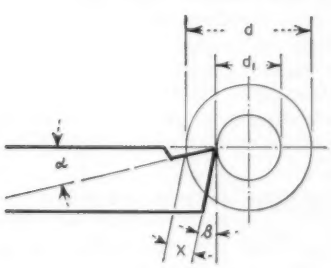
$$X = \frac{d - d_1}{2} \cos\beta$$

Top Rake ...
Tool Reaches Center



$$X = \frac{d \cos(\alpha + \beta)}{2}$$

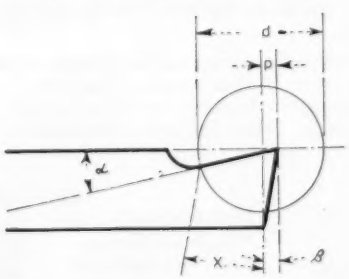
Top Rake ... Tool Does Not Reach Center



$$\sin\psi = \frac{d_1}{d} \sin\alpha$$

$$X = \frac{d \sin(\alpha - \psi) \cos(\alpha + \beta)}{2 \sin\alpha}$$

Top Rake ... Tool Goes Past Center



$$\sin\psi = \frac{2p \sin\alpha}{d}$$

$$X = \frac{d \sin(\alpha + \psi) \cos(\alpha + \beta)}{2 \sin\alpha}$$

HONING MAY BE *YOUR* ANSWER, TOO . . .

Like this offset bracket, it's quite possible that some of *your* products can be improved and production costs cut by honing inside diameters to provide smooth, accurate surfaces. In many cases, Sunnen Honing permits increased operating speeds because friction is reduced, thus allowing rotating, sliding and reciprocating parts to run smoother, cooler, and quieter.

Forgings of irregular shape or castings that are hard to chuck are ideal parts for Sunnen Honing, because costly fixtures are eliminated. You can produce any accuracy you need from extreme precision to simple de-burring—with surface finishes as low as 2 micro-inches RMS—in diameters from ⅛″ to 2⅝″.

Average installation costs under $1,000—delivered and in operation within 3 weeks. Our field engineers continue to serve you year-'round, without charge. Write for more information.

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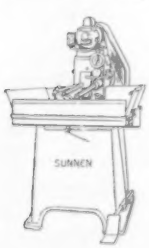
Honed Gage Bracket Sets Accurately, Slides Without Chatter... Set-up and Tool Sharpening Time Eliminated in Production

PROBLEM: To be sure of a product that meets their standards of quality, the B. C. Ames Company specifies no out-of-round, taper, or mis-alignment of tandem holes in this cast iron offset bracket with ⅛″ saw slots. Hole sizes are 1.000″ and 1.250″. Surface finish must be smooth to permit friction-free, chatterless sliding of bracket on post.

SOLUTION: Sunnen Honing easily holds the tolerance—produces better parts in less time than was possible with special expansion reamers. Production tie-ups (caused by slow delivery of special tools) have been eliminated. Production rate of 12 parts per hour—24 tandem holes—meets requirements. Ames now has a better, smoother operating bracket at less cost.



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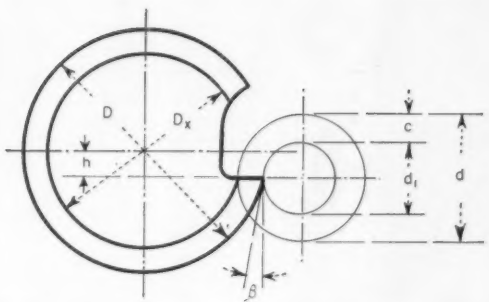
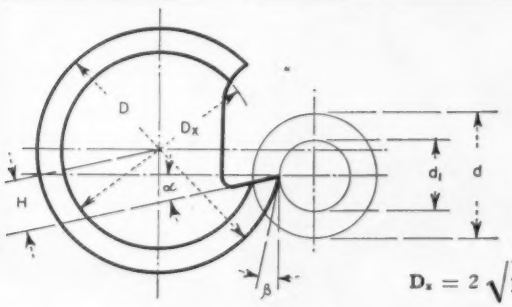
Circular Form-Tool Corrections

I ZORICH



No Top Rake

$$D_x = 2\sqrt{(\sqrt{R^2 - h^2} - C^2) + h^2}$$

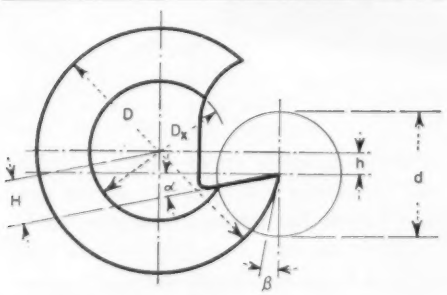


Top Rake

Tool Does Not Reach Center

$$\sin \psi = \frac{d_1 \sin \alpha}{d}$$

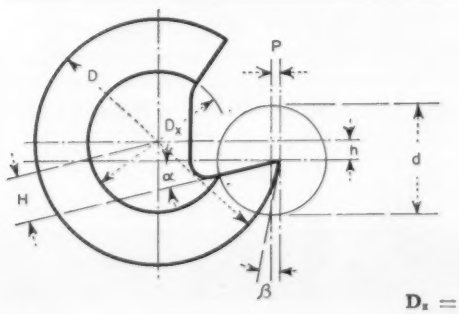
$$D_x = 2\sqrt{R^2 + \frac{d}{2}\frac{\sin(\alpha - \psi)}{\sin \alpha}\left[\frac{d}{2}\frac{\sin(\alpha - \psi)}{\sin \alpha} - 2R\cos(\alpha + \beta)\right]}$$



Top Rake

Tool Reaches Center

$$D_x = 2\sqrt{R^2 + \frac{d^2}{4} - Rd\cos(\alpha + \beta)}$$

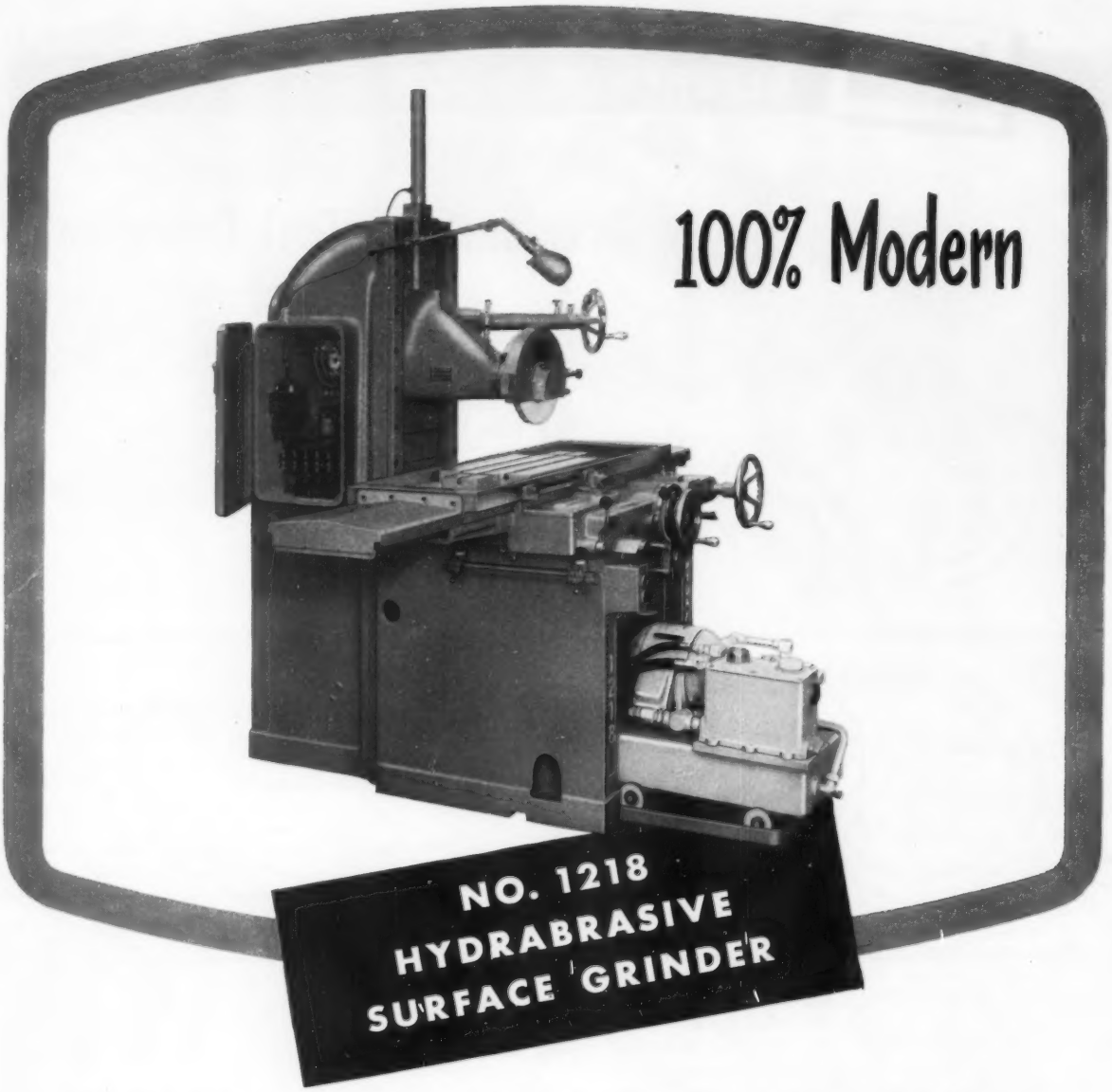


Top Rake

Tool Goes Past Center

$$\sin \psi = \frac{2p}{d}\sin \alpha$$

$$D_x = 2\sqrt{R^2 + \frac{d}{2}\frac{\sin(\alpha + \psi)}{\sin \alpha}\left[\frac{d}{2}\frac{\sin(\alpha + \psi)}{\sin \alpha} - 2R\cos(\alpha + \beta)\right]}$$



Beautifully modern yet accessible — that's the No. 1218 Hydrabrasive! There's none of the so-called "modern design" that's only window dressing, with operating parts blocked by streamline covers. On the No. 1218 notice how the hydraulic pump and tank unit rolls out on wheels for easy servicing. Also note the convenient electric control panel that fully meets J.I.C. codes. These are only two examples of Abrasive unit design that means complete accessibility.

The No. 1218 is built for today's high production grinding schedules. It speeds up all types of surface grinding, and its accuracy is a delight to operator and owner alike. Hydraulic operation provides table speeds from 1/2 to 90 ft. per min., with 3/8" of cross feed in 1/5 of a second. Specifications include: wide cross travel (12") and moderate table length (18"); saddle ball ways; and 3 HP spindle motor driving a standard 12" wheel. Write for latest complete catalog describing No. 1218 Hydrabrasive. Abrasive Machine Tool Co., 8 Dunellen Road, East Providence 14, Rhode Island.

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ACCURACY BOOSTS PRODUCTION

Abrasive Quality is Reflected in the Finish of Your Product

Diamond Pin Design

W PAUL WING

For ease of machining and inspection, a diamond pin should be dimensioned as shown in Fig. 1. The two simple methods described give dimensions C and D with no intermediate calculations. The first two of the following dimensions are known:

A = minimum hole dia of the work.

B = one-half the total work center distance tolerance plus one-half the total fixture center distance tolerance.

C = diamond-pin diameter.

D = working dimension.

In the first method, $C = A - 0.005$. When the resulting land-width would be less than 0.030, the second method is used. Method Two varies pin diameter C to maintain a 0.030-in. land width.

Known dimensions A and B are used to locate a point on Fig. 2. If the point falls in the shaded area, Method One is used. It it falls above the shaded area, Method Two is used. Table 1 gives formulas for each method. Below are examples for each method,

EXAMPLE OF METHOD 1:

Given: $A = 0.4000$; work center distance tolerance $= \pm 0.0020$; and fixture center distance tolerance $= \pm 0.0005$.

The total work center distance tolerance $= 0.004$

The total fixture center distance tolerance $= 0.001$

$$\text{Therefore } B = \frac{0.004}{2} + \frac{0.001}{2} = = 0.0025$$

Point 1 falls in the shaded area of Fig. 2, so method one will be used. From Table 1:

$C = A - 0.0005 = 0.400 - 0.0005 = 0.3995$ dia.

$D = 0.5841C - 0.0023 = 0.5841 \times 0.3995 - 0.0023 = 0.231$

EXAMPLE OF METHOD 2:

Given: $A = 0.4000$; work-center distance tolerance $= \pm 0.0040$; fixture center distance tolerance $= \pm 0.0005$.

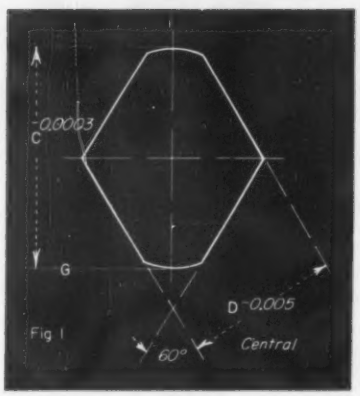


Fig. 1

The total work center distance tolerance $= 0.008$.

The total fixture center distance tolerance $= 0.001$.

$$\text{Therefore } B = \frac{0.008}{2} + \frac{0.001}{2} = .0045$$

Point 2 is located and the method two column of Table 1 is referred to:

$C = \sqrt{A^2 - 0.000621} = \sqrt{0.160000 - 0.000621} = 0.3992$ dia.

$D = 0.02598 + 0.5\sqrt{C^2 - 0.009} = 0.225$

Notice that the larger work tolerance in the second example results in a smaller pin diameter C and working dimension D.

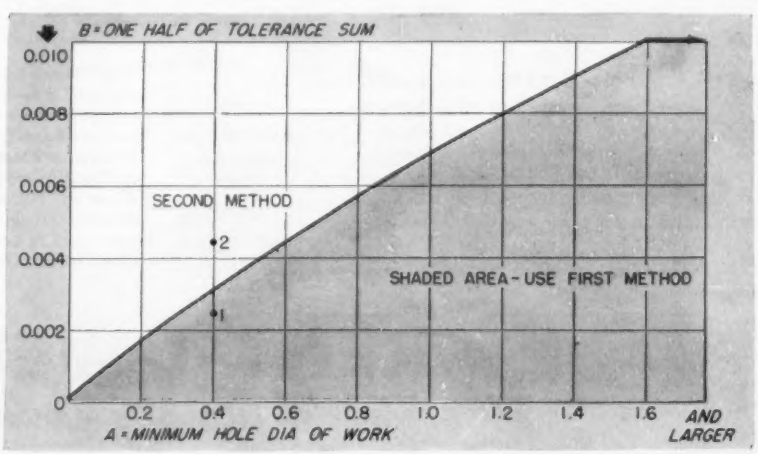
Table 1—FORMULAS FOR DIAMOND-PIN DIMENSIONS

Method One		Method Two
	$C = A - 0.0005$	$D = 0.02598 + 0.5\sqrt{C^2 - 0.0009}$
B	D	C
0.001	$0.7006C - 0.0009$	$\sqrt{A^2 - 0.000124}$
0.0015	$0.6373C - 0.0014$	$\sqrt{A^2 - 0.000189}$
0.002	$0.6043C - 0.0018$	$\sqrt{A^2 - 0.000256}$
0.0025	$0.5841C - 0.0023$	$\sqrt{A^2 - 0.000325}$
0.003	$0.5704C - 0.0027$	$\sqrt{A^2 - 0.000396}$
0.0035	$0.5606C - 0.0029$	$\sqrt{A^2 - 0.000469}$
0.004	$0.5532C - 0.0036$	$\sqrt{A^2 - 0.000544}$
0.0045	$0.5473C - 0.0040$	$\sqrt{A^2 - 0.000621}$
0.005	$0.5427C - 0.0044$	$\sqrt{A^2 - 0.00070}$
0.006	$0.5357C - 0.0053$	$\sqrt{A^2 - 0.000864}$
0.007	$0.5306C - 0.0062$	$\sqrt{A^2 - 0.001036}$
0.008	$0.5268C - 0.0070$	$\sqrt{A^2 - 0.001216}$
0.009	$0.5239C - 0.0079$	$\sqrt{A^2 - 0.001404}$
0.010	$0.5215C - 0.0088$	$\sqrt{A^2 - 0.00160}$

ACCURACY

In Method One, D formulas involve an approximation that is always less than 0.001 and is independent of pin size. The toolmaker is allowed − 0.005 in. on this dimension)

Method Two involves no approximations. Sometimes the difference between the pin diameter C and the maximum hole size will allow excessive radial play. If this occurs, it can be corrected by reducing the allowable work tolerance.



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TALKING SHOP

Eye Q

UNCAS MFG CO, Providence, RI, world's largest ring maker, is testing vision of its 800 employees in an exhaustive Eye Conservation Program. The company will contribute $10 for corrective safety glasses, $5 towards "civilian" glasses. Ordinary safety glasses are provided free, of course. Equipment from American Optical Co is making the tests, job by job, throughout the plant.

Safest Year

CATERPILLAR TRACTOR received the Award of Honor of the National Safety Council in 1952 for its safety record, topped that mark in 1953 with only 2.2 lost-time accidents for every million manhours worked. The 1952 record was 2.7. Several departments had no lost-time accidents in either year, and the Metallurgical Lab has had none for 11 years. Credit for the record is given to increased acceptance by employees, growing emphasis on safety education, and broadening of the company's safety-conference program.

Ken Team

TOOLING ENGINEERS Kenneth Dunn and Jack Lewis of the mfg research unit at Boeing developed an extra-tough plastic they called "Dunnlew." It would stand 36,000-psi pressure, but would not stand the –79 to +160 F temperatures they wanted for the job. So it was dropped. But Ken Jones, diemaker with 25 years experience who had machined the first Dunnlew samples, suddenly remembered joggle dies, and turned in a suggestion. So Ken Dunn resurrected the plastic and the two Kens worked out a method of facing steel dies with the plastic. This cuts out nearly all the close-tolerance finishing required. The die and punch (for both sides of the tool) are rough-formed in steel, then drilled to provide bonding holes for the plastic. An unjoggled part, coated with parting compound, is placed between punch and die, and set in a pouring box. The plastic is poured in and allowed 8 hr to harden, then the whole block is machined to size, sawed down the middle, the part pried out, and the plastic faces radiused. The new method takes 35 hr of finishing, the steel ones took 100 hr. To use the die, a suitable shim is placed under the die on one side, over the punch on the other, to create the desired offset for the joggle.

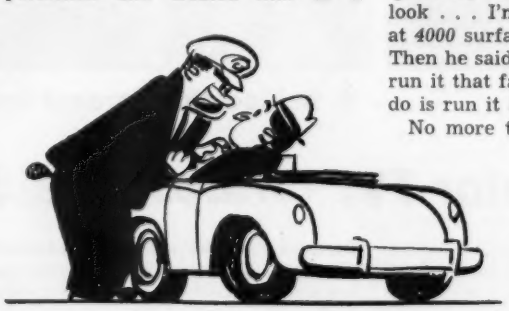
Hard Plate

FLAME-PLATED TUNGSTEN CARBIDE on a 0.235-in.-dia steel core rod upped output from 60,000 to 400,000 bronze meter bushings at American Meter Co, Erie, Penna. On a 0.294-in. rod, the increase was from 60,000 to 600,000, with only 0.0001-in. wear. Coating is relatively thin—from 0.002 to 0.010 in.

Personnel Revelation

THE PRESIDENT of a large, rapidly growing company was cruising through the plant parking lot recently in his battered convertible when a company guard stopped him for speeding. The president, normally a mild-mannered man, received a tongue lashing in the best old-Army top-sergeant manner that ended with, "Who the hell do you think you are anyway?" The president told him and drove on, leaving a chastened cop behind.

But as the president thought about it he got madder and madder. Suppose, instead of being president, he had been a machine operator, or a visitor, or a customer? Arrived at his office, the president went directly to the vice president in charge of personnel and treated *him* to a tongue lashing. Outcome of this incident is an intensive program of courtesy training for the plant guards and a bad case of insomnia for the president, who is now worrying about how a company can get so big that things like this might go on for years without the president ever knowing about them.



Foot Joined

HAMILTON WATCH has developed a new method of putting feet on watch dials instead of staking. Feet are applied by welding in simplified dies, reducing the dial-making cycle by 17 operations. Tooling time and cost are cut and a variety of textured surfaces may be used on dials. Such surfaces were formerly considered impossible to fabricate economically.

Half A Loaf

HIGH-SPEED MACHINING raises personnel problems which are sometimes pretty hard to handle. Example of this came up the other day when a company put in a new lathe meant to run at about 2000 sfpm. Tests were run and everything seemed OK so the builder's representatives went their way. A couple of weeks later the customer called and said the machine wasn't putting out as much as it was supposed to. Quick study by the supplier showed someone had cut down the speeds and feeds to about half what they were at first. Speeds and feeds were put back up, and everything was fine.

A couple of weeks later the company called again—same trouble, same remedy.

This happened three times. The fourth time it happened, the supplier's man took the union stewards, methods men, foremen, and the shop supervisor over to the machine in question, and said, in effect, "Now look . . . I'm going to run this job at *4000* surface feet." Which he did. Then he said, "We don't want you to run it that fast. All we want you to do is run it *half* as fast."

No more trouble.

THE VANCE PLAN: Is the Pentagon

Although the administration has earmarked $100 million of the $250 million reserve tool program (Vance Plan) for spending in 1955, the Pentagon to date hasn't set up formal criteria for the program's operation. Now it looks like the Defense Dept's delaying tactics may hold up placing of orders until next January

WASHINGTON — Major snag in carrying out the $250 million Vance Plan for building up standby production capacity through military procurement of long lead-time machine tools is the Defense Dept's failure to set up formal criteria for the program's operation—with the result that although the budget calls for spending $100 million of the fund in fiscal 1954, first machine tool orders probably won't be placed much before next January.

The Army and Navy recently submitted reserve tool projects to be financed with Vance Plan money, and the Air Force is still mapping out its projects.

Officials figure total costs of the projects will exceed $400 million. This means that the Pentagon must pare down the proposed projects substantially before any machine tool orders are actually placed—weeding out the less essential and less practicable projects. But the officials who will do the paring have been given no policy to follow as yet.

The Big Question

The big question is whether to (1) approve procurement project-by-project — shelving other projects wholesale, or (2) purchase longest lead-time tools individually—deemphasizing entire package projects.

This alone may delay placing of orders until January. Another delay: Air Force's inability to make up its mind as to what it wants from the Vance Plan. Asst AF Secretary (for Materiel) Roger Lewis has pigeonholed the projects, is said to be dissatisfied with proposed plans.

Project Details Classified

Details of individual reserve tool projects proposed by the services are highly classified. But it's understood that they resemble projects worked

Sub-Assembly

A Behind-the-Screens Look

Color TV: "It Costs Us $3000 to Make

PRODUCTION LINE employs about 375 people in assembling and testing color television receivers

HERE'S THE REASON WHY COLOR TV SETS COST SO MUCH. Typical black and white television set (left) contains about 700 parts, color television sets contain nearly 1500. And color sets require three times as long to assemble

Putting Roadblocks In Its Way?

out last year and later shelved. Total cost of these was $1.2 billion.

Typical of last year's projects:

- **Air Force** wanted to stock up on vertical turret lathes, horizontal and vertical broaching machines, horizontal Hydrotel and Keller machines, and large radial drills to meet jet engine needs for the next five years.
- **The Navy** sought about $8 million to complete tooling at its Lynn, Mass, marine reduction gear plant, and $3.6 million to buy 24 tools for eventual manufacture of steam-actuated catapults.
- **The Army** wanted about $60 million to build and equip a plant for output of "double-base propellants" (explosives), and money to buy more foundry capacity for tank hulls and turrets.

Unobligated Funds a Factor

When the reserve tool program actually gets off the ground, funds will be allocated by the Defense Secretary's office to individual services for actual procurement. A factor in allocating funds will be the amount of unobligated machine tool money still possessed by each service. The Vance Plan money would be added to these unobligated funds.

Top-level Pentagon officials are still lukewarm about the Vance Plan. The ball for the program is being carried by officials outside the Defense Dept, or by lower-echelon Pentagon planners.

And Vance Plan supporters are still unsure how the $100 million figure for fiscal 1955 was determined. Says one: "It was just picked out of the air, apparently."

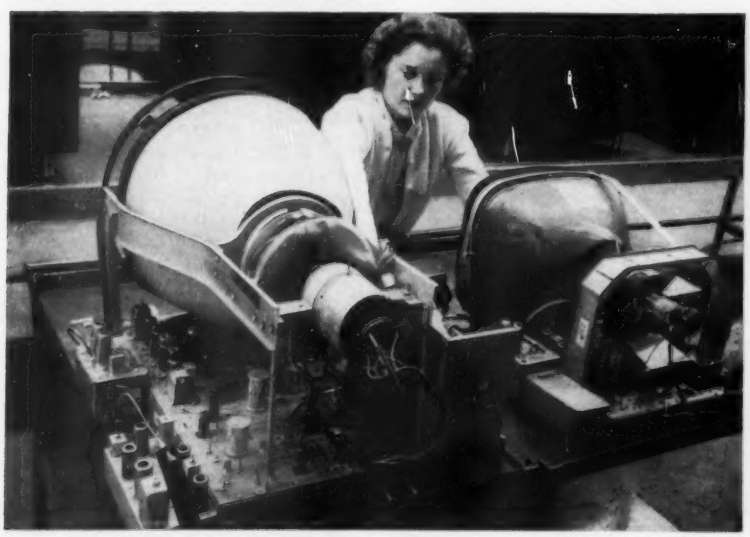
Pentagon officials say Presidential approval is needed before the program can get under way; that the President's Executive Office must okay each project.

A "Dodge"?

But one ODM official scoffs at this, calls it a dodge. He says Vance funds will be handled like other Defense Dept appropriations, and now that Congress has voted the money and the budget allows $100 million of it to be spent for fiscal 1954, the wraps are off.

Last year, it was assumed that ODM would be a watchdog over the reserve tool program, prodding the Pentagon into action. The Vance Committee's report had been made to ODM's Director. Since then, however, ODM's influence has dropped. An ODM official says his agency is "evidencing continued interest" in the reserve tool program. And file copies of the classified Army and Navy reserve tool projects have been dispatched to ODM. But that's all.

Observers are astounded that the Defense Dept's $250 million reserve tool fund is still untouched one year after its appropriation. This sort of thing doesn't happen often in Washington. And that's the best evidence of the Pentagon's lack of enthusiasm for the Vance Plan.



". . . 25-40% Are Rejected"

a Set That Retails for $1295"

TUBES ARE COLOR TV'S BIGGEST HEADACHE. Despite relative size (left), color tube shown is only 15-in. type, balance is Mumetal tube shield. Westinghouse rejects 25-40% of these tubes as failing to meet rigid quality control

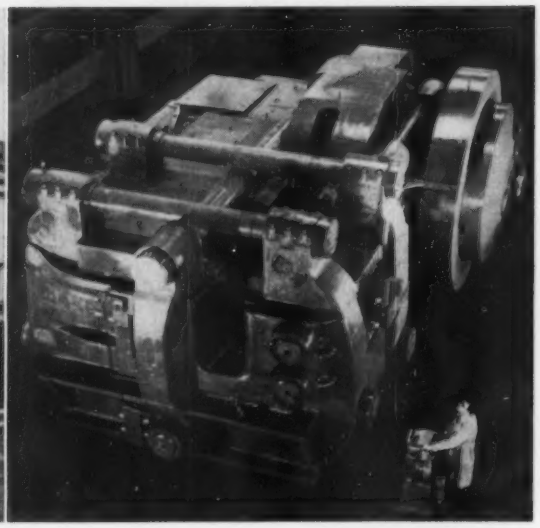
FIRST COLOR TV PRODUCTION LINE SET UP

METUCHEN, N J — Assembly line techniques are being applied to color television receiver production for the first time at Westinghouse Electric Corp's Television-Radio Division's plant here.

But current output on the plant's 115-operating-position, 400-ft-long assembly line is limited to about 22 sets a day, mainly because output is geared to the number of acceptable tubes (25-40% are rejected) received from outside sources.

At the Metuchen plant, sub-assemblies are completed on nearby lines, then funnel into the 400-ft main U-shaped assembly line. Chassis, mounted on wooden pallets, move from position to position every 2 min.

Although it costs Westinghouse about $3000 to build a set that today retails around $1295, the company is looking ahead to the day five or 10 years from now when color television will cost only 50% more than black and white.



Largest Horizontal Forging Machine?

IT TOOK EIGHT RAILROAD CARS, four of them beefed-up for the purpose to transport this 10-in. horizontal forging machine, reputedly the world's largest, from National Machinery Co's plant in Tiffin, Ohio, to Tube Turns, Louisville, where it will be used to forge military and commercial aircraft components. The machine, weighing 968,436 lb, is 14-ft 11½-in. long, 11-ft 9¼-in. wide, and 11-ft 8-in. high. Frame was cast in three sections, will be joined by forged tie-in bars and rods, all integral parts of the final assembly. Machine has an improved friction-slip clutch and a new type of diskbrake, and is powered by a 300-hp engine

Industry's "Hidden Payroll"

Fringe benefits are costing Cleveland manufacturers 31¢ per man hour . . . and they're on the increase

CLEVELAND — A survey of 160 local manufacturers employing almost 75,000 workers reveals that these firms are paying out an average of almost 31¢ per man hour in fringe benefits. And these firms' payments cover benefits in an average of 10.3 categories, compared with about 25¢ per man hour for 9.9 categories in 1951.

Biggest increase in fringe benefit costs is reported by companies employing 100 people or less. These companies are now paying an average of 32.2¢ per man hour, contrasted with 21.8¢ in 1951. Profit sharing, insurance, bonuses and pensions are chiefly responsible for the increase among these firms.

Fringe benefits, the survey reports, are in direct proportion to the length of the work week. And in recent years, most manufacturing firms have been operating on a 40-hour-plus basis.

The various fringe benefits reported in the survey include: bargaining and grievance time, bonuses, cafeterias, credit unions, gifts and other rewards, holidays, insurance, old age and survivors' insurance, unemployment compensation, workmen's compensation, lunch periods, payment to jurors, National Guard, pensions, profit sharing, recreational activities, paid rest periods, severance pay, vacations, wash-up time, welfare funds and miscellaneous.

Associated Industries Survey

The survey is the fourth in a series dealing with fringe benefits since 1948 undertaken by the Associated Industries of Cleveland as an industrial relations service to its member companies.

Metal Powder Show Slated for Chicago April 26-28

CHICAGO — Electronic cores and new powder metal techniques and applications will headline the three-day technical program of the 10th annual meeting of the Powdered Metal Association here April 26-28, sharing the limelight with new developments in metal powders at the Metal Powder Show.

Technical sessions will be divided into a general session on powder metallurgy, and a separate all-day meeting on electronic cores.

Powder metallurgy session April 27-28 will include presentation of papers on: "Friction and Lubrication in Powder Metalllurgy," "Lubrication Practices with Metal Powder Bearings," "Non-Destructive Testing of Sintered Brass Parts," "Powder Metallurgy in the Automotive Industry," "Aircraft Applications for Powder Metallurgy," "Powder Metallurgy vs Other Precision Forming Methods," "The Manufacture of Sheet Metals from Metal Powder," "Carbide Flame-Plating in Powder Metallurgy," and "Semi-Formed Drawing Stock."

All-day Electronic Core session April 27 will cover "Method of Determining the Temperature Coefficient of Electronic Core Materials," "Some Electronic Applications of Iron Powder Cores," "Applications of MPA Core Standards and Data Sheets," and "Threaded Iron Cores."

What Will the Public Spend in '54?

Less than it did last year, a Federal Reserve Board survey shows — but 1954 consumption will still be big by almost any standard because most consumers think prices will come down this year

WASHINGTON—The American public doesn't plan to spend as much this year for hard goods — automobiles, housing and appliances — as it planned to spend a year ago. That's what the Federal Reserve Board's survey of "Intentions to Buy" shows—and it gives some mild warning signals to economists and businessmen keeping a sharp eye on signs of a business slide or upturn.

Here's the percentage of "spending units" (families) who say they plan to buy, compared with last year and the year before:

TYPE OF PURCHASE	Early 1954	Early 1953	Early 1952
Houses	6.8	8.8	6.4
New cars	7.8	9.0	6.8
Used cars	6.2	6.2	6.0
Furniture and Major Appliances	26.8	31.9	23.2

If consumer intentions reported in the survey are borne out, 1954 will be a big year by almost any standard, but down from 1953.

In the past, consumers have shown a tendency to stick fairly close to their plans as reported in January and February, but FRB adds a word of caution this year: the survey has never been tested in a period of generally declining business. And it might not now be as accurate a guide as it has been in the past.

Auto Buying May Drop

Plans for buying autos pretty much typify the consumer's frame of mind. Intentions to buy new cars are smaller than when the survey was made in early 1953 and 1950. But here's something the table doesn't show—consumers expect to pay less for used cars. This expectation of lower prices appears in other intentions to buy, too. Without it, consumer plans to buy would be lower.

Among major household appliances, there's considerable variation. The survey indicates less TV sets and refrigerators will be bought. But washing machine purchase plans are about the same as for last year.

Consumers were asked about their plans to buy houses in 1954, and in 1955. The two years combined indicate about the same level of house buying shown in the surveys for 1952 and 1953.

Smaller Paychecks in '54?

Behind consumer thinking is an increasing doubt about chances for improved incomes. In January-February 1953, 34% expected to be making more money at the end of the year. This year, the comparable figure is 19%. Last year, 10% thought their incomes would decline; this year 15% expect to be making less.

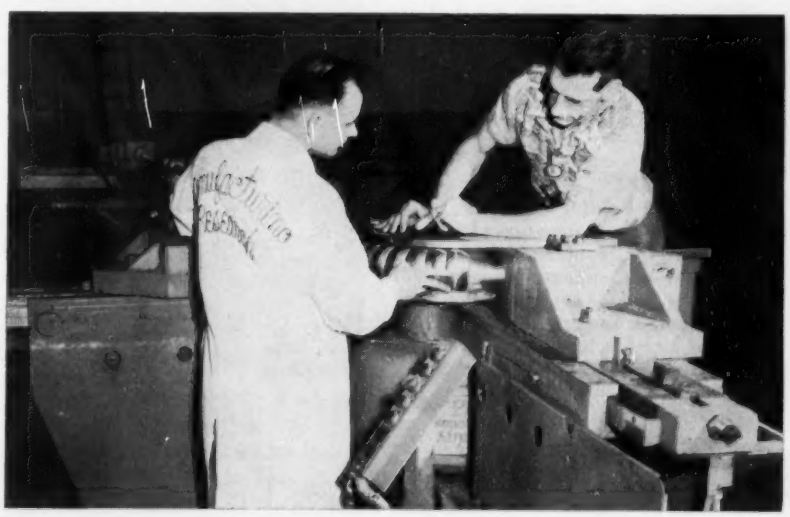
Despite this income picture, consumers seem to think 1954 is going to be a good time to buy. On the whole, they rate it just about as good as they did 1953. But their reason has changed. A year ago, the most frequent reason was the prospect of higher income: this year it's the prospect of lower prices.

Expect Price Cuts

More than a third of the consumers interviewed expect prices to decline during the year—somewhat more than had that expectation a year ago, and markedly more than expected lower prices when the survey was made in 1951-52.

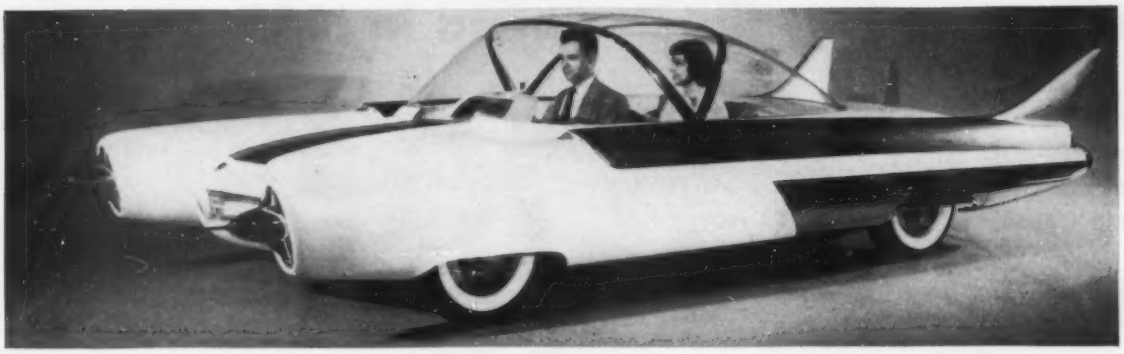
Along with a decline of confidence in their personal financial prospects, consumers reported increasing doubts about the economic trend in the country as a whole. A majority said the prospects were good, but FRB's experts reported "a sizable number felt prospects were unfavorable."

Survey's returns are based on 2800 interviews out of 3000 made by FRB's staff.



Saves $14,000 per Plane

STAINLESS STEEL TUBING WITH WALLS AS THIN AS 0.0175 IN. is bent in this modified version of a Pines Engineering Co machine at Boeing Seattle. Tubing is re-sized by compressing it in a die, thus correcting for too-great tolerances and ensuring perfect bends. Boeing specifications require that tolerances must not exceed 0.030 in. in 500 ft. Formerly, bends in the tubing were made by forming elbows in two half-tubes with a drophammer, then arc-welding the elbows together. New method saves up to $14,000 per plane



Pedestrian Impalers?

"IT'S NOT SO FANTASTIC AS YOU MIGHT THINK," say Ford designers of the FX-Atmos (FX for "future experimental), who claim many of its features may show up on standard Ford models in the next few years. Driver sits forward of passengers in the center of the passenger compartment, steers the car with handgrips that control a power steering unit. But while no official survey has been conducted, it is safe to assume that the already-long suffering pedestrian would be just as happy if Ford would drop any idea of making the twin "pedestrian impalers" standard

Defense Contracting:

Is Small Business Getting the Short End?

"We don't want handouts, but we do want contracts on a sound, economic basis," small manufacturers tell House committee

LOS ANGELES — Small manufacturers are fighting a losing battle against large companies in competition for contracts under the stretched-out defense procurement program. That is the opinion of West Coast small businessmen who testified at a recent hearing held here by the House Subcommittee on Small Business.

Spokesmen told the committee, chairmaned by Rep Craig Homer of Long Beach, Calif, that they weren't looking for handouts, but for contract awards on the basis of sound economics and the importance of the small manufacturer to the country's defense program.

"There is a tendency," they told the committee, "toward over-emphasized concentration of procurement with large companies, and withdrawal of work into prime contractors' plants simply to keep government-furnished facilities fully occupied."

Lloyd G Hallamore, president, Hallamore Mfg Co, said that subcontractors feel that major prime contractors should "continue to subcontract to small manufacturers that portion of the work that would normally be subcontracted under full mobilization."

Poll 100 Manufacturers

Another spokesman for the small companies, Hampden Wentworth, president of Longren Aircraft Co, said he had polled 100 small Southern California manufacturers, got 97 replies. The manufacturers, he said, were almost unanimously in agreement that these objectives should be accomplished with aid of the Small Business Administration:

Small Business Objectives

- Small defense plants meeting "certain minimum qualifications of size and skill" must be included in mobilization planning and be regarded as "an integral part of our powerful production reserve."
- Contracts being prosecuted in government-owned, furnished or leased facilities should be so written that all items produced therein are offered for subcontract work for competitive bids at all times—security-restricted items and major final assemblies excluded.
- Major prime contractors should be given an incentive on all work subcontracted, so as to encourage subcontracting whenever man-hour efficiency of the subcontractor excels that of the prime.
- "To keep the mobilization base as broad and strong as possible," primes and subcontractors "must be encouraged" to reduce their output proportionally, maintaining like percentages of subcontracts at all levels.
- "A policy of arbitrarily moving defense contracts from highly skilled industrial areas into purported labor distress areas can cause extreme hardships to existing industry, thus causing a great over-all loss to the taxpayer."
- To increase available risk capital, tax laws for small business should be revised so that the owner can set his own depreciation rate on equipment and plant purchases, and personal income tax on dividends received from small businesses should be waived completely so long as the company in question qualifies as a small business — or for five years after an investment in small business.
- More patent protection should be given the manufacturer of proprietary items for the government.

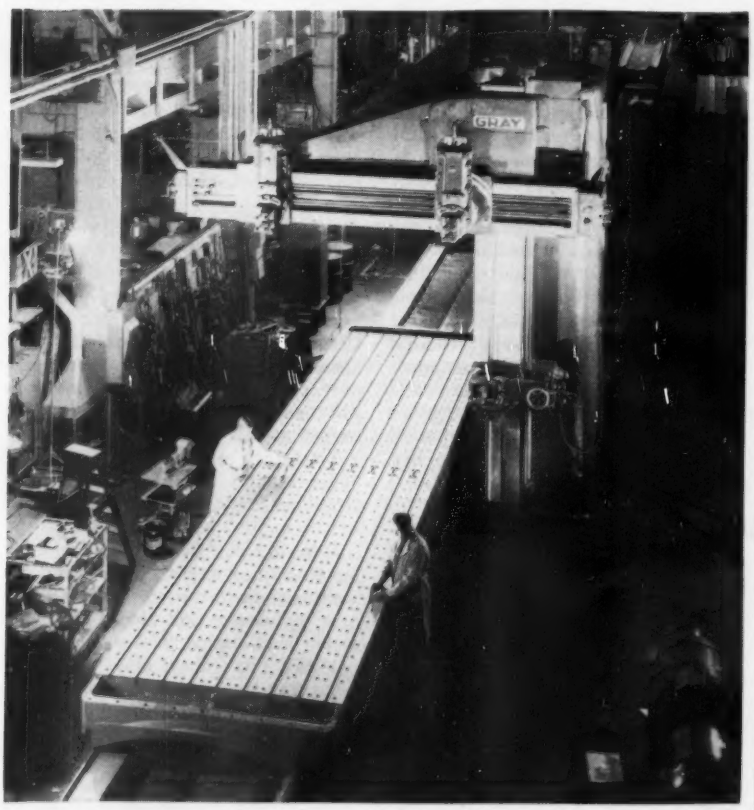
Water Treatment Kills Coolant Bacteria

BALTIMORE — Bacteria in water-soluble cutting fluids, long a bugaboo to the metalworking industry, may soon be a thing of the past. A European-developed water purification method, the Hyla process, has proved in tests at Johns Hopkins University that it will not only kill bacteria effectively, but that its bactericidal action continues for some time.

This could mean that Hyla-treated water in cutting fluids may considerably lengthen the time these fluids can be used before they have to be discarded because of bacterial contamination.

The Hyla process uses the ability of silver salts to kill germs, known since the Romans put silver bars in their aqueducts to sterilize the water. It is the first time that this method has been applied in a process applicable to such large-scale installations as industrial and municipal water supplies, air conditioning units, etc.

In the manufacture of Hyla units, silver salts are deposited on a common carrier, such as activated charcoal, fixed in place and dried. Treated carrier is installed in a specially-designed exchanger unit through which mechanically filtered water is passed. Water is safe for human consumption and the process imparts no odor or taste. Salem-Brosius, Inc, Pittsburgh, is Hyla's Western Hemisphere license and patent holder.



Giant Planer for West Coast

SAID TO BE THE LARGEST ON THE WEST COAST 120-in. x 120-in. x 30-ft heavy-duty, high-speed openside planer is shown undergoing assembly in the plant of G A Gray Co, Cincinnati, builders of the machine, prior to its shipment to Bethlehem Pacific Coast Steel Co. The 142-ton planer took two years to build, required six freight cars to move it from Cincinnati to the West Coast

Textile Firm Goes Into Metalworking

Susquehanna Mills Merges with H & B American Machine Co, sells out textile interests

NEW YORK — Merger of H & B American Machine Co with its three metalworking operating divisions into Susquehanna Mills, Inc, of New York City and Sunbury, Pa, was announced March 10 in an unprecedented move in which Susquehanna will change its name to H & B American Machine Co, Inc, and will abandon most of its textile manufacturing business.

Susquehanna Mills in the last two years has lost upwards of $4 million in the recent widespread textile recession. Company officials, seeing the handwriting on the wall, sold one of the company's two textile plants, at Philmont, NY, for $500,000. Looking about for more profitable fields to enter, Susquehanna officials approached H & B American Machine Co, parent company of the Midwest Division, Los Angeles and Indianapolis aircraft parts manufacturers; Karp Metal Products Division, Brooklyn manufacturers of sheet metal products; and Octigan Division, Chicago foundry producing drop forgings.

Stock Conversion

Under terms of the merger, subject to stockholder approval, H & B stockholders will get $7.50 per share in 3% ten-year notes of the surviving corporation. In addition H & B common stockholders will receive 1¾ shares in the company for each share of H & B stock.

Half of Susquehanna's common stock will be converted into an equal number of shares of the surviving company: balance of Susquehanna common stock, plus its 3% four-year notes, will be issued to Susquehanna creditors in partial cancellation of claims.

H & B's present management will direct the surviving corporation, headed by President Victor Nemeroff.

And here's a switch: the new H & B American Machine Co, Inc, will go into the textile business, operating Susquehanna's plant at Sunbury, Pa.

Plant and Equipment Spending:

The Outlook for '54 Is Good

Capital goods manufacturers, by practicing their own credo of "more plant for more prosperity" are showing US business the way toward another year of high-level spending to meet expanding markets of the future

WASHINGTON — Makers of plant equipment and machinery turned in a booming first quarter of investment in plant and plant equipment of their own. And their plans for the year as a whole are only slightly behind 1953. In this generally optimistic appraisal of the future, capital goods makers are joined by business as a whole, as revealed in a survey of investment plans conducted by the Security and Exchange Commission recently.

The survey indicates that demand for capital goods and equipment will be less in 1954 for almost all lines of manufacturing and mining. But the decline will be slight, if February intentions are borne out.

Primary Metals Spending Drops

Sharpest cuts are planned by the primary metals industries. And nondurable goods industries such as food processing, textiles, chemicals and petroleum products plan to invest somewhat less than last year, but don't show the same amount of increase as the hard goods industries.

Business generally is brushing past questions about the nature of the current downturn. But top management has told the Security and Exchange Commission that it intends to invest more than $27.2 billion this year in plant and plant equipment. This compares with about $28.5 billion last year—the greatest on record—and $26.5 billion in 1952.

The SEC report is based on business plans as reported in February.

This year is getting off to the biggest start ever—with business investing some $500 million more than in first quarter 1953. That means plans for the second six months at present call for a drop of around $1.5 billion, compared to the amounts spent in the same period last year.

In recent years, business has often revised its investment plans upward as the end of the year approaches. Whether this will be the pattern in 1954 is a question that the administration wishes it had the answer to. Its tax revision program, now going through the Congressional mill, is designed to stimulate investment. If it has that effect, 1954 could easily wind up even with record 1953, or even exceed it.

Slump Has Little Effect

Balancing this cheerful picture, of course, is the continuing softening of business, mostly in the hard goods lines. But SEC officials point out that when their survey was made in February, the downturn had already been underway for seven months—with no dampening effect on actual spending in first quarter 1954—and with only slight effect on plans for the year as a whole.

US BUSINESS SPENDING ON NEW PLANT & EQUIPMENT 1953-54

(Million of dollars)

	1953	1954*
MANUFACTURING	$12,276	$11,410
DURABLE GOODS INDUSTRIES	5,821	5,220
Primary iron and steel	1,340	990
Primary non-ferrous metals	456	330
Electrical machinery & equip.	481	490
Machinery except electrical	803	720
Transportation, motor vehicles	1,168	1,430
Stone, clay and glass products	339	300
Other durable goods	1,233	960
NON-DURABLE GOODS INDUSTRIES	6,455	6,190
MINING	1,011	1,040
TRANSPORTATION (excl. railroads)	1,464	1,400
RAILROADS	1,312	940
PUBLIC UTILITIES	4,548	4,430
COMMERCIAL, ETC.	7,778	8,010
TOTAL EXPENDITURES	28,391	27,230

* Estimate based on anticipated capital expenditures as reported by business in February, 1954.

...and MAPI thinks so, too

CHICAGO — US business still isn't spending as much as it should for new plant and equipment to keep pace with gross national output in recent years.

That's the most recent finding to come out of Machinery & Allied Products Institute's continuing study of the capital goods outlook.

Says MAPI, "Certainly there is no suggestion of any excess in total investment since the war, nor is there any indication that the recent rate is not sustainable in the future."

MAPI researchers add, "An acute need for capital goods, arising from a longer period of underinvestment in depression and war, does not generate the financial wherewithal to satisfy itself.

"Available funds continue to be limited basically to current depreciation and depletion accruals and retained earnings, plus what industry is willing and able to add by borrowing and the issuance of stock . . . financial capacity is not expansible in proportion to the need, and it becomes, therefore, the limiting factor."

Plastic Dies Hold PMI Meeting Spotlight

New resins are expanding use of plastic dies into drop-hammer, draw-die and other applications in the metal stamping field, Pressed Metal Institute told

CLEVELAND — Interest of metal stamping men at Pressed Metal Institute's Fifth Annual Spring Technical Meeting here centered on the use of plastic dies in metal stamping applications.

A panel of automotive and plastics experts, with John B Kendall of Ford Motor Co as moderator, discussed the progress and possibilities of using plastic dies in the stamping industry. Panel members were: Fred Lyijynen, Briggs Mfg Co; J F O'Reilly and Edsel Ruddiman of Ford Motor Co; George M Rice of Renaud Plastics, Inc; and Robert Voss of Warren Plastics. The highlights:

Today, 20% of all dies used in the automotive industry are plastic. Development of new resin compounds in recent years has permitted use of plastic dies for use in stamping applications where toughness is of paramount importance—for drop-hammer dies, draw dies and hammerform blocks.

A plastic drop-hammer die made for tryout on aluminum, water-hardening steel and titanium has proved successful. This die was deliberately damaged and easily repaired by filling in with epoxy resin. Other applications included a stretch-form die and a blanking die with metal inserts for a cutting edge in a blanking operation.

At Warren Plastics, draw dies have run from a few thousand pieces up to 60,000 pieces. But plastic dies are still in the developmental stage and a better material from which to make them is still being sought. Present dies are a combination of phenolic, polyester or epoxy resins with varying types of fillers. To date, phenolic resin has proved best.

Prime advantages of plastic dies are their accuracy, lightness and low cost (cost of a plastic spotting master is about two-thirds that of a metal master). Another advantage of plastic is elimination of the profiling required with iron or steel. Gages and checking fixtures in many cases do not require the strength that steel construction affords, and the cost and time involved in making them with plastic offers a considerable advantage. Dimensional stability of plastic has proved sufficient for these tools.

Other applications include: experimental dies, Hydroform press dies and plastic drill jigs.

Other sessions at the three-day meeting covered stamping plant safety, power press problems, materials handling and resistance welding.

Stamping Plant Safety

First of these, on stamping plant safety, opened the morning of March 17 with a film, "A Record of Progress," narrated by Lowell Thomas and dealing with the Stanley Works' safety program. Following this, Dan Farrell, director of safety, US Steel Co, spoke on an "Engineering Approach to Safety." Luncheon speaker was R T Halbert of Liberty Mutual Insurance Co, who discussed "Human Relations in Safety."

Power press problems session the afternoon of March 17 was a three-part panel discussion with G E Deming Jr, Heintz Mfg Co, as moderator and featured three talks: "Press Operators Learn Their ABC's," by Leland S Madden, Heintz Mfg Co; "On Guard—Large Press Operations," by R H Luckenbach, Budd Co; and "No Hands Off Policy —Small Press Operations," by J M Transue, Philco Corp.

Materials Handling

A T Gaudreau, Gaudreau, Rimbach & Associates, as moderator led off the session on in-process material handling the morning of March 18. Speaking on the influence of material handling on metal stamping processing, he said that the equivalent of 50 tons of material weight is handled for every ton of finished product shipped, and that 40% of every wage dollar spent by industry is for materials handling.

As much as two-thirds of the duration of a machine process is spent on materials handling at the work station, Mr Gaudreau said, and material flow must be coordinated with speed of processing to make an appreciable dent in handling time.

One way in which this is being done, he said, is to buy coiled steel instead of flat sheet stock or bundles. This permits machines to be fed automatically. He also cited inclineable presses, wherein stock is fed to press at front and the stamping piles up in the back, as a means of permitting continuous flow instead of single feeding and withdrawing.

P E Youngdahl of Mechanical Handling Systems, Detroit, said all handling that does not specifically perform an operation on the part in process should be automatic. Automation, he added, is as useful to small plants as it is to large ones.

E V Crane of E W Bliss Co showed slides of presses equipped with transfer, dial hopper, roll and magazine feeds. And R A Barth of the Barth Corp showed a film illustrating Barth machines built for performing various operations on sealed-beam headlamps, brushes, etc.

Resistance Welding

Thursday afternoon session on resistance welding had as its first speaker W A Stanley, Progressive Welder Sales Co, who pointed out that such variable factors as production requirements, materials and equipment make it impossible to set up standards for design of parts. Mr Stanley discussed several ways in which best use could be made of resistance welding in stamping.

Controls for resistance welding were the topic of S C Rockafellow, Robotron Corp, who said that relays are the most vulnerable controls and must be kept clean at all times. He went on to describe the advantages of "slope control" (controlling time allowed for current to rise from minimum to maximum values and back down again). These are: lower electrode forces, less material cleaning, less critical welding schedules, and less tip pickup.

J J MacKinney, The Budd Co, speaking on production resistance welding, discussed the relative advantages of spot, seam and projection welding, and showed a General Electric film dealing with volume production of electrical equipment with resistance welding methods.

Joseph M Schaeffer

Victor Frederiksen

Edward H Farmer

Names in the News . . .

Joseph M Schaeffer has been elected president of the Waterbury Farrel Foundry & Machine Co, Waterbury, Conn. Former President **Richard L Wilcox** has been named chairman of the board to succeed **David C Griggs,** who will continue as a director of the company. **Richard C Bannon,** Cleveland office sales manager, has been elected a vice president, and **A Dale Mitchell,** treasurer, succeeding **Lewis S Reed,** retired. Mr Schaeffer was formerly a vice president and director of the company, and chief engineer of the Bolt Nut & Screw Machinery Div.

Dr Alexander Blakely has been appointed vice president, manufacturing, for the Metal Removal Co, Chicago. He will be in charge of all abrasive grinding wheels and disks. Before joining the firm, Dr Blakely had been production manager for the Vesuvius Crucible Co.

Victor Frederiksen has been appointed to the newly created post of chief industrial engineer of Chrysler Corp's Dodge Div. Mr Fredericksen, working under General Works Manager M C Patterson, will supervise methods, automation, and general factory procedures. He joined the division on special assignment to the plant engineer in 1947, and five years later was named to that post. **Albert L Wilson,** who succeeds Mr Frederiksen, has been a member of the firm since 1925; for the past three years he has been plant engineer at the Chrysler Jet Engine unit near Utica, Mich.

Russell W Bill has been appointed sales manager of Illinois Tool Works' Shakeproof Div, Elgin, Ill. Mr Bill joined the division in 1935 as a salesman for the upper New York territory, a post he held until 1950 when he was made eastern district manager.

Edward H Farmer has been named plant manager of E W Bliss Co's recently acquired San José, Calif, works. Mr Farmer has been associated with Lockheed Aircraft Corp, Burbank, Calif, for the past twelve years, most recently as works manager. From 1929 to 1941 he was a member of the Bliss organization's Toledo, Ohio, Div, serving as assistant works manager from 1939 to 1941.

R F Allen has been named assistant to the executive vice president of H K Porter Co, Pittsburgh. Prior to the appointment Mr Allen headed the Stansteel Corp, College Point, NY, and served as manufacturing manager of Brewster Aeronautical Corp.

H J Kalberkamp has been appointed chief engineer of Mesta Machine Co, Pittsburgh. Associated with the firm for 28 years, Mr Kalberkamp joined Mesta in 1926 as a machine designer of heavy steel mill equipment. He has served most recently in the position of division engineer of the proposal department.

Dr Alexander Blakely

Russell W Bill

H J Kalberkamp

C L Peterson

Joseph S Pelles

Paul W Norris

C L Peterson has been named divisional vice president of the Brown Instruments Div, Minneapolis-Honeywell Regulator Co, and **O B Wilson**, general sales manager. Mr Peterson, who had managed divisional sales since July 1952, will devote the major part of his time to sales policy matters and long-range planning. In addition, he will assist President H F Dever in carrying out managerial duties at the policy-making level. Mr Wilson, industrial instruments sales manager since January 1953, will assume active administration of the entire divisional sales department. Mr Peterson has been a member of the organization since 1927, and Mr Wilson since 1923.

Walter S Praeg, president of National Broach & Machine Co, left by air March 12 to visit industrial firms in the Melbourne and Sidney, Australia, manufacturing areas. During his visit Mr Praeg will tour Australian automotive, marine, and locomotive manufacturing plants and service installations. He will also meet with officials of Demco, his firm's Australian sales representatives, who have offices in both Melbourne and Sidney.

C Paul Porterfield has been elected vice president and general manager of The Method X Co, an affiliate of Firth Sterling, Inc, Pittsburgh. He moves up from his post as chief engineer of the company, designers of electro-mechanical machining equipment.

Frank M Mansfield III has joined General Electric's Carboloy Dept, Detroit, as manager of product programming. He was formerly associated with Torrington Co as district manager in Cincinnati from 1950 to 1953, when he transferred to Detroit as district engineer.

Joseph S Pelles has been named sales manager, Transportation Industries, Lewis-Shepard Co, Watertown, Mass. Mr Pelles has served the trucking industry for the past three years as a staff member of the American Trucking Associations, Inc, and for the past year and a half has been secretary of the ATA Terminal Operations Council.

Alfred J Porter, manager of the Bridgeport, Conn, plant of Heppenstall Co, steel forgings manufacturer, has been elected a vice president of the Pittsburgh company. Mr Porter has been a member of the organization since 1914, and has served as production manager, sales manager, and plant manager.

Paul W Norris has been appointed director of sales for Denison Engineering Co, Columbus, Ohio; **Robert H Krepps** has been promoted to sales manager; and **Robert R Hyatt** named director of industrial relations. Mr Norris, formerly sales manager, Pump & Control Div, also served as chief engineer and sales manager, Multipress Div; and manager, Research, Development, and Marketing Divs. Mr Krepps moves up from his post as Multipress Div sales manager.

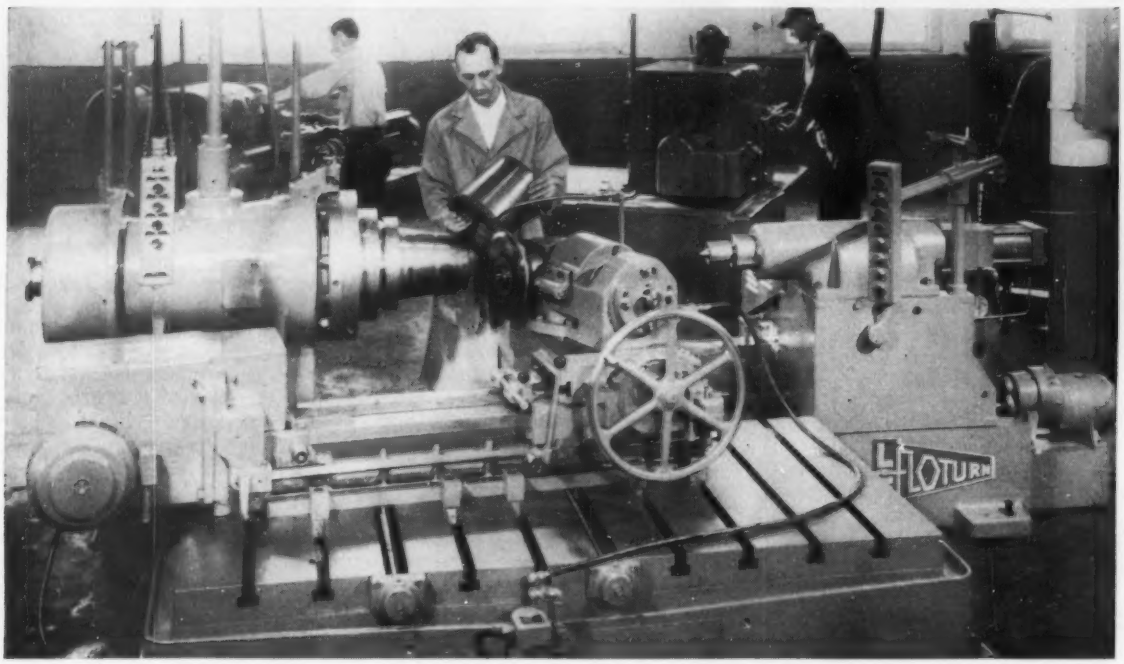
E Philbin de Got has been elected vice president of United Drill & Tool Corp. He will continue his duties as sales manager of the Chicago-Latrobe Div.

OBITUARIES

Frederick U Conard, 62, president and general manager of the Pratt & Whitney and Chandler-Evans Divs of Niles-Bement-Pond Co, West Hartford, Conn, and president of the Potter & Johnston Co, Pawtucket, RI, subsidiary, died suddenly on March 14 at his home in West Hartford. He was widely known throughout this country and abroad in business and metalworking fields. Prior to joining the company in 1947 as its chief executive, Mr Conard had been associated for 28 years with the Underwood-Elliott-Fisher Co, now Underwood Corp, serving in various executive capacities in New York, Bridgeport, and Rockford, Ill. In 1938 he was made vice president of of the company in charge of Hartford operations, a post he held until joining Niles-Bement-Pond.

Lester F Nenninger, 59, assistant manager of the machine tool division of Cincinnati Milling Machine Co, and vice president of the company's sales subsidiary, Cincinnati Milling & Grinding Machines, Inc, died suddenly March 16 at his home in Cincinnati. Mr Nenninger joined the company in 1912 as a tool and fixture designer. In 1926 he was appointed chief engineer; in 1943 he was named works manager, and last January he was appointed to the position he held at the time of his death.

New Shop Equipment



Floturn Contour Lathe Roll-Forms...

Lodge & Shipley lathe uses a 68-70 R_c hardened roller to form shapes symmetrical about a common axis from flat or preformed blanks, of Series 300 and 400 stainless steels, Titanium T1-140-A, Timken 16-25-6 and 17-22S alloys, Haynes Muttimet, Universal Cyclops Uniloy 19-9, Monel and K-Monel, Inconel and Inconel-X, mild steel, aluminum, copper, and brass

Using a hardened-tool-steel pressure roll and a symmetrically shaped mandrel, the Lodge & Shipley No. 40 Floturn lathe will cold-form hollow conical and cylindrical parts from flat disks, press-drawn cups, or blanks premachined from bar stock, forgings, or centrifugal castings. It will handle blanks up to 42-in. dia, and is made in two sizes to provide 24- and 50-in. working travel of forming-roll carriage.

The Floturn lathe is similar to a power spinning lathe, in that it forms the blank against a revolving mandrel. But pressures applied by the forming roll are considerably in excess of those employed for conventional spinning operations. The metal being formed is not folded down against the mandrel as in spinning. Rather, its peripheral size and shape remain the same throughout the forming operation, and the metal is thinned as it is pressed tightly against the rotating mandrel. Reductions of more than 75% have been achieved in one pass when forming some stainless-steel parts with this method.

Because of the heavy forming pressures required, the large headstock spindle is mounted in heavy-duty Timken tapered roller bearings, and has an ASA B1-20-in. standard lathe spindle nose. A No. 3L key-drive taper spindle nose adapter is provided for mounting small taper-shank mandrels.

Spindle is driven by 20-hp adjustable speed motor through V-belts. A motor-generator set and control panel give spindle speeds from 333 to 1000 rpm at constant horsepower, and from 33 to 333 rpm at constant torque.

Tailstock of the Floturn lathe is moved along the bed by motor-driven screw for rapid positioning. It is located by adjustable stop dogs. The tailstock housing is clamped to the bed hydraulically, and the tailstock spindle is positioned hydraulically to hold the workpiece blank against the end of the rotating mandrel. Live center has capacity for 10,000-lb thrust at 500 rpm.

Front portion of the lathe baseplate is a T-slotted platform on which the roll carriage bed is positioned, adjustable from parallel with spindle axis to 50° out of parallel, permitting roll-forming cones with 100° included angle. Cylindrical shapes up to full 42-in.-dia capacity of lathe may be rolled.

Roll carriage is provided with a handwheel-adjusted slide for positioning the pressure roller. An adjustable positive locating stop on the slide is provided for repetitive work. The carriage is moved along ways on

Materials and Parts

Hollow Cylinders and Cones

Parts ranging in size from a few inches in diameter to cones and cylinders used with the largest aircraft jet engines have been roll-formed successfully with the Flotum process. Samples shown above are only a few of those rolled in performance demonstrations

top of the carriage bed unit by screw driven from a gearbox at one end. Driven by a flange-mounted ¾-hp pancake motor, this gearbox uses pick-off gears to provide roll-traversing feeds of ¼, ⅜, ½, ⅝, ⅞, 1, 1½, 2, 2½, 3, 3½, 4, 6 and 9 ipm for metal-flowing operations; the two higher feed rates also can be used for mandrel grinding operations. Five adjustable automatic stops are provided between the ways of the carriage bed for limiting the power feed of the roll carriage, as well as its 12-fpm-return rapid traverse.

A 7-gpm-capacity coolant pump is provided to deliver liquid lubricants to point of contact. For maintaining the surface accuracy of forming mandrels, an auxiliary 10-hp, 1200-rpm grinding head with capacity for 20-in.-dia, 2-in.-face abrasive wheels is available.

Forming rolls are made from heat-treated HSS, hardened on the periphery to 68-70 R_c and polished smooth. Rolls of 10-in. OD with 1/16 to ¼-in peripheral radius and relieved at one side, with a bevel face ranging from 15 to 50°, generally are used when roll-forming stock up to 5/32 in. thick. For thicker stock, up to 5/16 in. thick in hard-to-form metals and up to ½ in. thick in mild steel, copper, aluminum and other easy-to-form metals, straight-face 10 and 12-in.-dia rolls with up to ¾-in.-edge radius are employed. Forming rolls are supported on Timken tapered roller bearings and usually have a deflector ring to minimize cramping of the roll periphery along the workpiece flange ahead of the point of forming. Roll assemblies are fitted with studs to facilitate interchange of rolls.

The Lodge & Shipley Co. 3055 Colerain Ave, Cincinnati 25, Ohio

...INCLUDING

Bearing lubricator consists of series of metering pumps, each supplying one bearing and individually adjustable..... page 152

Hydraulic hob sharpener handles HSS and carbide-tipped hobs and form-relieved cutters to 6-in. dia by 5-in. face..... page 153

Vacuum forming machine, for high-speed handling of thermoplastic sheets and films, is completely self-contained... page 154

Die sinker is reported capable of copy-milling every type of contour, including the stepless tracing of vertical walls..... page 156

Apron conveyor line, piano-hinged type, includes three pan models, four chain pitches, and four basic assemblies..... page 158

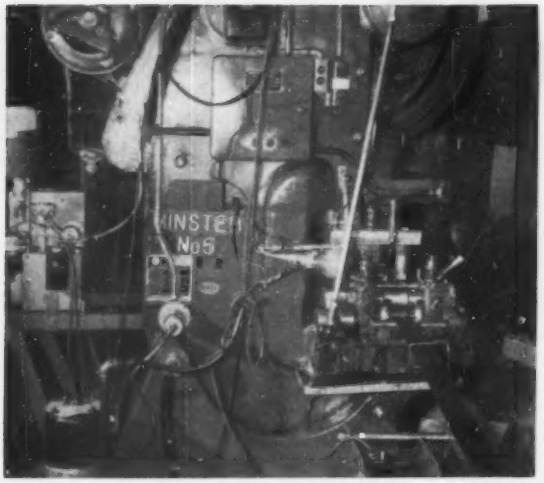
Variable-speed drive, electronically controlled, is responsive to signals based on load, current, light, temperature, etc.. page 160

Double-column way grinders, designed to handle machine tool beds, can be used as regular surface grinders..... page 162

Cylindrical grinder has workhead which swivels to 90°, can grind up to 10 in. in length between centers..... page 164

...and in Apr 12

In addition to the regular New Equipment department, a special section will preview the new machines, parts, and materials to be shown at the 1954 Industrial Exposition of the ASTE.



Early installation of the lubricator is on this No. 5 Minster press at United-Carr Fastener Corp. Lubricator stops press whenever it fails to deliver required amount of oil to each lubricating point on the press

Monitor Lubricator with cover lifted shows pressure switches mounted in pairs above the individual gear pumps. Disassembled in foreground is one of the special orifice assemblies installed at each lubricating point on the machine

Bearing Lubricator Provides Positive Control

To provide positive control of lubrication to machine bearings, the Monitor Lubricator has been developed by Acumeter Laboratories working in cooperation with United-Carr Fastener Corp.

United Carr lubrication problems were accentuated at higher speeds. Bearings that might last for millions of cycles still failed frequently enough to require development of a method that would give positive assurance that the right amount of clean oil of proper viscosity was being delivered to each bearing.

The Monitor Lubricator consists of a series of stainless-steel metering pumps driven by a motor through a speed reducer. Each pump supplies one bearing and each can be set to produce the required flow.

Two pressure switches are connected to each pump output line. These are individually adjusted to high- and low-pressure limits for the line.

Lubricant is supplied from a polyethelene bottle giving a visual check of remaining supply, is filtered, and passes through the metering pumps and supply lines. At the bearings it is delivered through a restricting orifice that establishes a specified back pressure on the line.

Actuation of any of the pressure switches will shut off the press (or other machine tool on which the lubricator is installed) and by a colored panel light will show which line is at fault and whether the pressure is high or low.

The press cannot start until the predetermined pressure is flowing through the orifices at each bearing. Once flow rates are established the operator is unable to adjust the flow of any of the units.

If the supply tank is loaded with oil of improper viscosity, the pressure will change and stop the machine. Similarly an empty tank or a clogged filter will stop the machine.

If the intake line to the lubricator breaks or leaks or there is failure of the motor or power supply, the machine is stopped.

Failure of any metering pump, a break or leak in any discharge line, clogging of any line or of any orifice —any of these conditions will stop the machine.

Frequently bearings are overlubricated in an effort to assure adequate supply for high-speed operation. Because of positive supply of this lubricator, flow rates can be set to actual requirements. Acumeter claims that indications are this will save about 40% in oil consumption.

Optional equipment is available to stop the machine if temperature rises above a predetermined operating maximum.

Acumeter Laboratories, Inc, 27 Mica Lane, Newton Lower Falls 62, Mass

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Danly Clutch Air Valve Increases Press Safety

Danly dual air valve is designed specifically to eliminate accidental stroking of mechanical presses due to valve failure. It consists of two independent pilot-operated valves actuated by electromagnets (pilot valves) and air (main valves). The valves are built into a single unit and cross ported in such a way as to provide maximum safety. This construction reportedly offers a safety factor not dependent on mechanical life of valve. The only chance for unsafe failure is that both sides of valve fail simultaneously in open position. In addition, during millions of test cycles, neither valve element has ever failed in the open position. The unit can be installed on a press with a pressure switch, so should either side of the valve fail to function, resultant drop in pressure in the air supply tank will break the control circuits.

Danly Machine Specialties, Inc, 2100 South Laramie Ave, Chicago 50, Ill

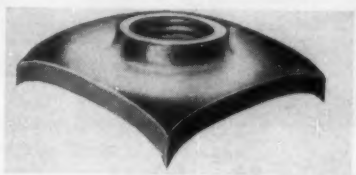
Mercury Rectifier Power Drive For Adjustable-Speed Service

Reliance Electric has announced development of a mercury rectifier variable-voltage power drive designed for broad range of industrial applications requiring adjustable-speed service. Known as the Reliance Xatron V-S Drive, it represents the results of four years of research and engineering. Utilizing mercury-arc rectification of a newly developed single-anode mercury-pool rectifier tube, Xatron, it provides another way to convert alternating current to controlled dc variable voltage. The first size of air-cooled rectifier available provides conversion suitable for 30, 40 and 50-hp drives.

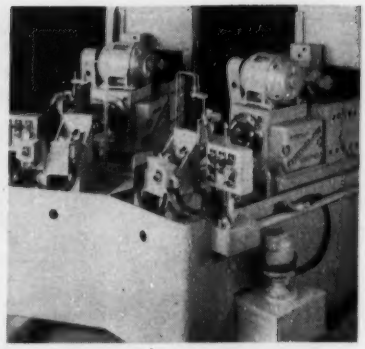
The drive consists of: operator's control station, adjustable speed drive motor, and control unit enclosed in compact cabinet. Features claimed by Reliance include: wide speed ranges, smooth and powerful starting; stepless acceleration, close speed regulation, fast response, high overload capacity, conveniently centralized control, power applied directly, and savings in floor space.

An idea of the speed ranges available can be obtained from the 30 hp drive which ranges from 105 to 1700 rpm up to 220 to 1750 rpm. Other speed ranges are available for special applications, also lower speeds needed for jogging, inching, and creeping. Optional features include: dynamic-braking circuit; magnetic-reversing control; and multi-motor drive arrangement.

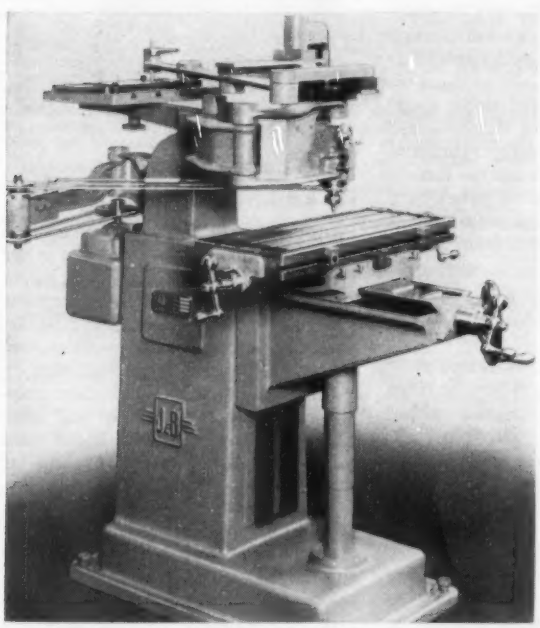
Reliance Electric & Engineering Co., 1088 Ivanhoe Rd., Cleveland 10, Ohio



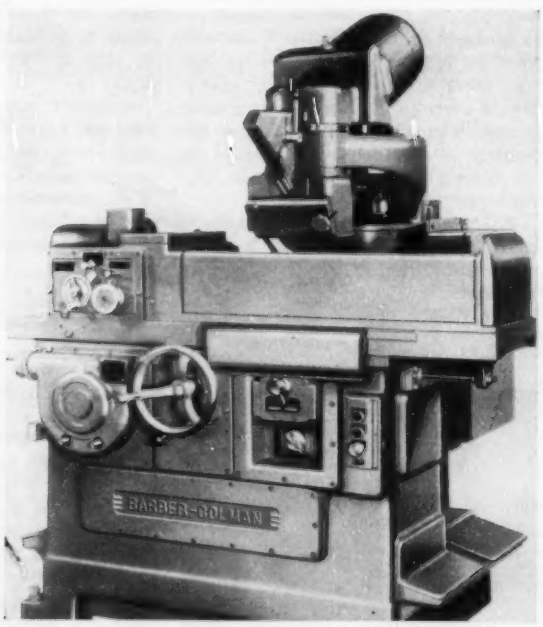
CONCAVE FASTENER made of spring steel, with cut threads and self-locking corners, eliminates need of lock washers and special assembly tools. Sizes presently available are 6-32 and 8-32 —*Waterbury Pressed Metal Co, P-Nut Div, 300 Chase Ave, Waterbury, Conn*



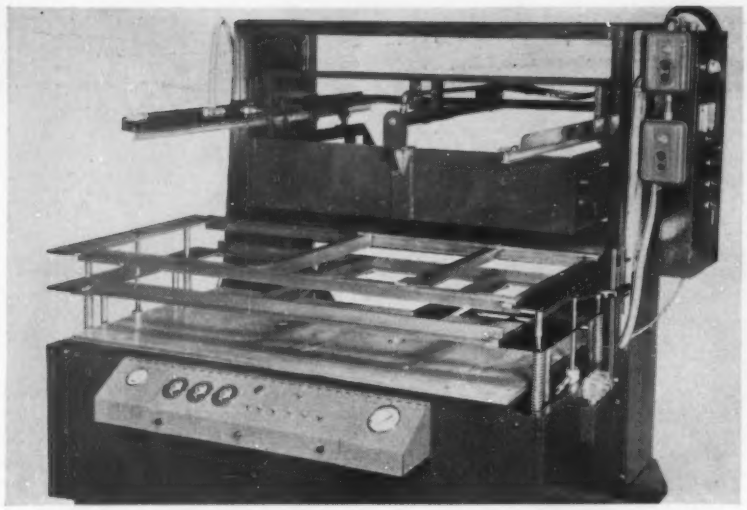
SHEFFIELD SPECIAL MACHINE threads main transmission shaft with ⅞-16 U 2A thread 11/32 in. long at rate of 400 parts per hour. It incorporates two Precision-Pak threading units, with automatic cycling. Units are mounted on specially constructed welded base and positioned at 45°. Each Precision-Pak has internal threading capacity ranging from 1⅛ to 4 in. and external from ¾ to 3½ in. It will generate a maximum thread of 8 pitch, spindle travel from ½ to 4 in. and spindle speeds from 38 to 346 rpm in 15-rpm increments — *The Sheffield Corp, Dayton 1, Ohio*



PANTO-MILLER is a precision pantograph engraver designed for production engraving, profiling, die-cutting, and milling in steel, cast iron, non-ferrous materials, and plastics. With spindle arm locked, it also does conventional milling. Construction is of stress-relieved Meehanite and ball bearings are used at all critical points. Reduction ratios vary from 1:1 to 1:40; spindle speed is infinitely variable from 1200 to 11,500 rpm without belt changing. Copy table is 10½ x 16 in.; worktable, 10 x 26 in.— *Johnson & Bassett, Inc, Worcester, Mass*



HOB-SHARPENER, hydraulic, handles HSS and carbide-tipped hobs and form-relieved cutters, sharpening tools with straight or helical flutes, shell or shank type, up to 6-in. dia by 5-in. face. Once settings have been made, machine automatically indexes and feeds. Table speed is adjusted by hydraulic flow control valve. Central push-button panel provides control over machine elements. Accurate guidance is provided for flute spacing, rake angle, lead of gash, and surface finish. It is equipped for wet grinding — *Barber-Colman Co, Rockford, Ill*



Bench Mill Accessories

Line of special accessories for the Barker bench mill is available to widen the versatility of the machine. Special low-spindle-speed drive has been developed for slitting and straddle milling. In addition to standard spindle speeds of 1000 - 1725 - 3000, nine new speeds are available in a range from 214 to 768 rpm. Special stub arbors are available to take standard high-speed steel or carbide slitting saws and cutters. Also included are a cutter guard, 2-in. riser blocks to raise column and head where special fixtures require it, and a 3¼-in. graduated, swivel-base vise complete with wrench and T-bolts.

Barker Engrg Co, 500 Green Rd, Cleveland 21, Ohio

Tamco Vacuum Forming Machine Is Completely Self-Contained

Tamco Hydro-Vacumatic, Model HV-30-60, is reported to be the first completely self-contained machine for high-speed vacuum forming of thermoplastic films and sheets. Machine is ready for operation as soon as it is plugged into an electrical connection. Its built-in components include air compressor and mold clamp frame assembly as well as hydraulic pump. The mold clamp frame assembly is completely adjustable in all dimensions permitting wide latitude and use of molds.

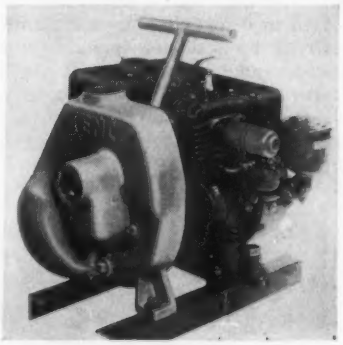
All-steel unit has a 30x60-in. platen. Plastic sheets with a maximum dimension of 27x57 in. can be handled.

The height of the unit is 74 in.; width, 73 in.; depth, 68 in. The weight is 3000 lb. Table height is 33 in. from floor and clamp travel allows for 17-in. maximum depth of draw.

The Chromalox strip heater has three banks operated in any combination to provide temperature range to 1150 F. The heating assembly is 50x31 in.

Controls include hydraulic gage, vacuum gage, solenoid valves wired with four delay timers, miniature precision-switch assembly, and a West pyrometer. Control panel with knobs, gages, and pushbuttons is conveniently located in front of the machine.

Tamco Industries, Inc, 290 Broadway, Huntington Station, LI



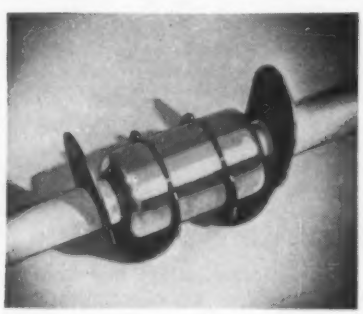
Kenco Portable Pump For Industrial Use

Portable Pump No. 114 is completely self-priming, has no valves or moving parts other than motor, pump impeller, and seal. It delivers over 100 gpm at lowest head, and is capable of forcing water to maximum height of 100 ft. It is self-priming.

The unit has an open-face nonclogging type impeller. It will handle all solids passed by Kenco suction strainer affixed to end of suction hose. Non-clog impeller is fastened directly to engine shaft without couplings, keyways, or other intermediate devices. Impeller is positioned on threaded engine shaft by spacer and securely tightened. Adjacent to impeller face is 3/16-in.-thick steel wear plate fastened to pump casing by two countersunk-head carriage bolts.

Intake and discharge connections are tapped for 1½-in. pipe thread; pipe plug is provided for drainage. Pump is powered by redesigned Briggs & Stratton 1½-hp engine.

Kenco Pump Co, 1125 No Ridge Road, Lorain, Ohio



Tube Coupling Simply Connected

Meca coupling was specially designed to simplify process of connecting tubing or pipe in any size range. Manufacturer reports that the most inexperienced can connect the tubing or pipe into a sealed connection able to withstand extremely high pressures, in a matter of seconds. It is available in different types of materials and designed with special O-rings for any type of liquid, gases, or temperatures.

One of the features of the coupling is the interior grooving. Grooves at each end contain rubber O-rings or silicon or teflon rings, depending upon use. Sleeve is tapered on inside to allow for variation in OD of tubing or pipe. Coupling has stop in center that allows for insertion of tubing to fit equally in each side. The spring clip grips tighter as pull pressure is applied.

The Master Enterprise Corporation of America, Boulder Bldg, Tulsa, Okla

FYI

FOR YOUR INFORMATION

FREE Catalogs, Booklets, Charts, Calculators

FYI—these initials symbolize information that's important. And there is much of importance in the literature listed here. To get the ones you need, all you do is fill out one coupon for each booklet you wish to order. Indicate in the circle on the coupon the number of one catalog wanted. When you have filled out a card, detach, stamp, and mail. We'll do the rest.

MACHINES AND ATTACHMENTS

1 VERTICAL TURRET MILL—*Rogers Machine Works, Inc, Buffalo 10, NY.* 6-page bulletin 653 illustrates the "Perfect 36" for boring, drilling, turning, and threading; includes features and specifications.

2 DRILLING & TAPPING MACHINE—*Edlund Machinery Co, Cortland 3, NY.* 8-page illustrated bulletin 140 describes variable speed Model 2F. Variety of arrangements to meet specific requirements presented. Construction features and ordering information provided.

3 AUTOMATIC TURRET LATHE—*Potter & Johnston Co, Pawtucket, RI.* 4-page bulletin 153 contains detailed specifications of Model 4-U. Features illustrated, as well as a typical application.

4 DIE-CASTING MACHINE — *Cleveland Automatic Machine Co, Cincinnati 13, Ohio.* 4-page folder describes two smallest machines in the Cleveland line; Model 50, for aluminum, brass, or magnesium alloys (change of hot metal end equips unit for casting zinc, tin, or lead); Model 100, for zinc, tin or lead (end can be changed to convert to cold chamber.) Specifications included.

5 OPPOSED SPINDLE DRILLING MACHINES—*Walter P Hill, Detroit 19, Mich*—2-page catalog sheet provides operating description, application data, specifications, for condenser tube sheet drilling unit that drills up to 1200 ¾-in-dia holes on 15/16-in. centers in forged steel sheets from 2 to 5-ft dia, and up to 6 in. thick.

6 BENCH MILL—*Barber Engrg Co, Cleveland 21, Ohio.* 4-page circular illustrates unit with 3-way hand lever travel to facilitate intricate, rapid production milling of small parts. Special accessories sheet provided.

7 WIRE STRAIGHTENING & CUTTING MACHINES—*Mettler Machine Tool, New Haven, Conn.* 4-page bulletin 58 illustrates and describes line of constant speed automatic units, ranging in capacity from 0.025 to ½-in.-dia wire.

8 KNUCKLE PRESS—*Verson Allsteel Press Co, Chicago 19, Ill.* 8-page illustrated K-53 includes design details, typical models, and specifications on complete line for squeezing operations such as coining, embossing, or sizing.

9 LATHES—*K Martin, Machine Tool Works, Offenburg, Baden, West Germany.* 5-page folder illustrates production high-speed lathe Type DP 500; 5-page folder on heavy-duty high speed lathe, Types KM 180 and 200. Includes specifications and design features.

TOOLS AND ACCESSORIES

10 SCREW THREADS—*Greenfield Tap & Die Corp, Greenfield, Mass.* 52-page handbook of technical information on Unified and American threads. Covers tap and product limits; tolerances; table of constants for finding elements; suggested taps and tap drills; speeds and lubricants.

11 DRILL JIGS—*Swarts Tool Products, Detroit 38 Mich.* 44-page catalog 953 illustrates extensive line of fixtures. Includes applications, technical data, and price list.

12 TWIST DRILLS—*The DoAll Co, Des Plaines, Ill.* 12-page brochure illustrates and describes variety of types, including new XL drills, designed to assure more holes per grind. Data on drill pointing and web thinning included.

13 REMOTE BULB THERMOMETERS—*Minneapolis-Honeywell Regulator Co, Philadelphia 44, Pa.* 44-page catalog 6709 covers selection data; recorders and indicators; pneumatic, electric, and program control; psychrometers; bulbs, tubing and fittings.

14 CARBIDE BURS—*Pratt & Whitney, West Hartford 1, Conn.* 19-page illustrated booklet on Kellerflex line describes 12 standard shapes. Contains data on proper use, recommended speeds, resharpening service.

15 DECIMAL EQUIVALENT CARD—*South Bend Lathe Works, South Bend 22, Ind.* 8⅝ x 5½-in. chart lists equivalents of fractional parts of an inch to six places.

16 CARBIDE TWIST DRILLS—*Super Tool Co, Detroit 13, Mich.* 12-page circular 541 describes carbide tipped and

Name .....
Title .....
Company .....
Co. Address .....
.....
AMERICAN MACHINIST, New York

FILL IN BELOW NUMBER OF ONE CATALOG WANTED

Not good after June 1, 1954

(duplicate)
(duplicate)
(duplicate)
(duplicate)
(duplicate)
(duplicate)

FYI — FOR YOUR INFORMATION

solid carbide line. Specifications, instructions, price data provided.

17 FEED & SPEED CALCULATOR—*Wendt-Sonis Co, Hannibal, Mo.* For all carbide machining operations; has wide range of feeds, speeds, and depth of cut, also a carbide grade chart.

18 CENTER HOLE CHART—*Ready Tool Co, Bridgeport 5, Conn.* Guide for determining sizes lists maximum load on centers in pounds, ranging from 100 to 300,000, gives minimum shaft dia required, and subsequent hole dias that should be used, based on the predetermined factors.

HEAT TREATING & WELDING

19 THERMOCOUPLE & EXTENSION WIRES—*Thermo Electric Co, Saddle River Township, NJ.* 8-page bulletin 31 illustrates and describes wires most often used for pyrometric work. Calibrations, gages, and strandings listed; engineering data provided in chart form.

20 ELECTRIC SOLDERING IRONS—*Hexacon Electric Co, Roselle Park, NJ.* 4-page catalog 106 illustrates additions and improvements to line of 40 models in seven types, 25 to 700 w; ⅛ to 1¼-in. tips. Includes prices.

21 STOCK FURNACE & OVEN CONTROLLERS—*The Bristol Co, Waterbury 20, Conn.* 2-page bulletin P1262 illustrates instruments for permanent mounting or portable use, and control accessories such as thermocouples and protection tubes, and the potentiometric test set.

PLANT SERVICE EQUIPMENT

22 FORK TRUCK—*Barrett-Cravens Co, Crescent Truck Div, Chicago 9, Ill.* 16-page bulletin contains specifications and dimensional drawings on eight Palletier models with capacities of from 1000 to 8000 lb, available in a range of lifting heights.

23 FIRE HAZARD PROTECTION—*Ansul Chemical Co, Marinette, Wis.* 15 technical bulletins cover recommended procedures for protecting difficult and unusual fire hazards.

24 MACHINE SCHEDULING — *Remington Rand, New York 10, NY.* 6-page brochure KD738 "Sched-U-Graph for Machine Loading" contains data on effective systems and products that implement them. Covers load ahead of each machine, work station, or machine center; jobs that constitute the load; scheduled starting and completion dates; how much, and when, free time is available.

25 INDICATOR EQUIPMENT—*General Electric Co, Schenectady 5, NY.* 16-page booklet GEA-5779B covers line of oil-tight pushbuttons, indicating lights, selector switches, and accessories. Operation and application data, cross-section drawings, photos, diagrams, and ordering information included.

26 PROTECTIVE COATINGS — *Atlas Mineral Products Co, Mertztown, Pa.* 50-page booklet of data on coatings described on a generic basis.

27 MATERIALS HANDLING—*Factory Service Co, Milwaukee 9, Wis.* 28-page book "Turner System of Materials Handling" offers ideas for savings in labor, space, and equipment. Illustrated applications, and new units pictured to provide mobility to semi-finished products.

28 CONVEYORS—*Link-Belt Co, Chicago 1, Ill.* 4-page folder 2470 illustrates piano-hinged apron units in a wide range of styles and capacities.

29 MAINTENANCE CONTROL—*The McCaskey Register Co, Alliance, Ohio.* 6-page folder on "one-writing" multiple copy forms, visualized on job assignment boards, planning boards, and similar McCaskey equipment.

PARTS AND MATERIALS

30 HYDRAULIC VALVES—*Hydraulic Power Div, Hydraulic Press Mfg Co, Mount Gilead, Ohio.* 2500 basic models listed in new line of directional and functional valves, each available with optional body styles, types of control, methods of operating, and other features for universal application. Catalog 801 covers 2000 psi units with sub-plate connections; 821, 3000 psi with flange connections; 841, 3000 psi sub-plate valves.

31 SPEED DRIVE CONTROLS—*Reeves Pulley Co, Columbus, Ind.* 24-page booklet G-537 on automatic production control illustrates and describes complete line. Includes means of solving problems involving control of tension, acceleration, deceleration, velocity, and peripheral speed, synchronization of one or more machines, maintaining of uniform temperature, pressure, liquid level, and flow.

32 TRI-CLAD MOTORS—*General Electric Co, Schenectady 5, NY.* Three bulletins illustrate and describe "55" line built in 1-30 hp ratings to latest NEMA dimensions. 16-page booklet GEA-6013 covers drip-proof models; 8-page GEA-6012, enclosed motors; 14-page GEA-6027, gear motors.

33 HIGH-SPEED TOOL STEELS—*Bethlehem Pacific Coast Steel Corp, Seattle, Spokane, Portland, San Francisco, Los Angeles.* 31-page illustrated booklet describes 66HS, HM, M-10, Special HS, and Comokut tool steels.

34 ROLL - FORMED TUBING & MOULDING—*Acme Tube, Inc, Irvington 11, NJ.* 30-page catalog, a guide to selection, describes and illustrates roll-forming method; classifies each of basic types of tube, channel, angle, and moulding producible. Describes new Tight-Butted seam tube.

35 SCREW THREAD INSERTS—*Heli-Coil Corp, Danbury, Conn.* 4-page bulletin 654 illustrates how threads that have been stripped or worn can be repaired quickly and permanently by inserts. Tables indicate proper selection to repair and match NC, NF, pipe, automotive, and aircraft spark plug threads.

36 WORM GEAR SPEED REDUCERS —*Eberhardt-Denver Co, Denver 4, Col.* 48-page catalog 1006 illustrates complete line, including new PoweRgear unit. Engineering data on selection, hp and torque calculations, and service factors.

37 OILITE BRONZE BEARINGS — *Amplex Oilite Products, Detroit 31, Mich.* 25-page bulletin S-53 covers heavy-duty, oil-cushioned, self-lubricating bearings. Lists more than 700 Standard bearings, cores, bars, and plates.

38 STAINLESS STEEL—*Armco Steel Corp, Middletown, Ohio.* 4-page folder lists available literature, including 44-page general catalog; booklets and handbooks on a wide variety of processes and operations.

39 GALVANITE STEEL—*Sharon Steel Corp, Sharon, Pa.* 11-page booklet describes hot-dipped, zinc-coated strip steel with high resistance to corrosion and rust.

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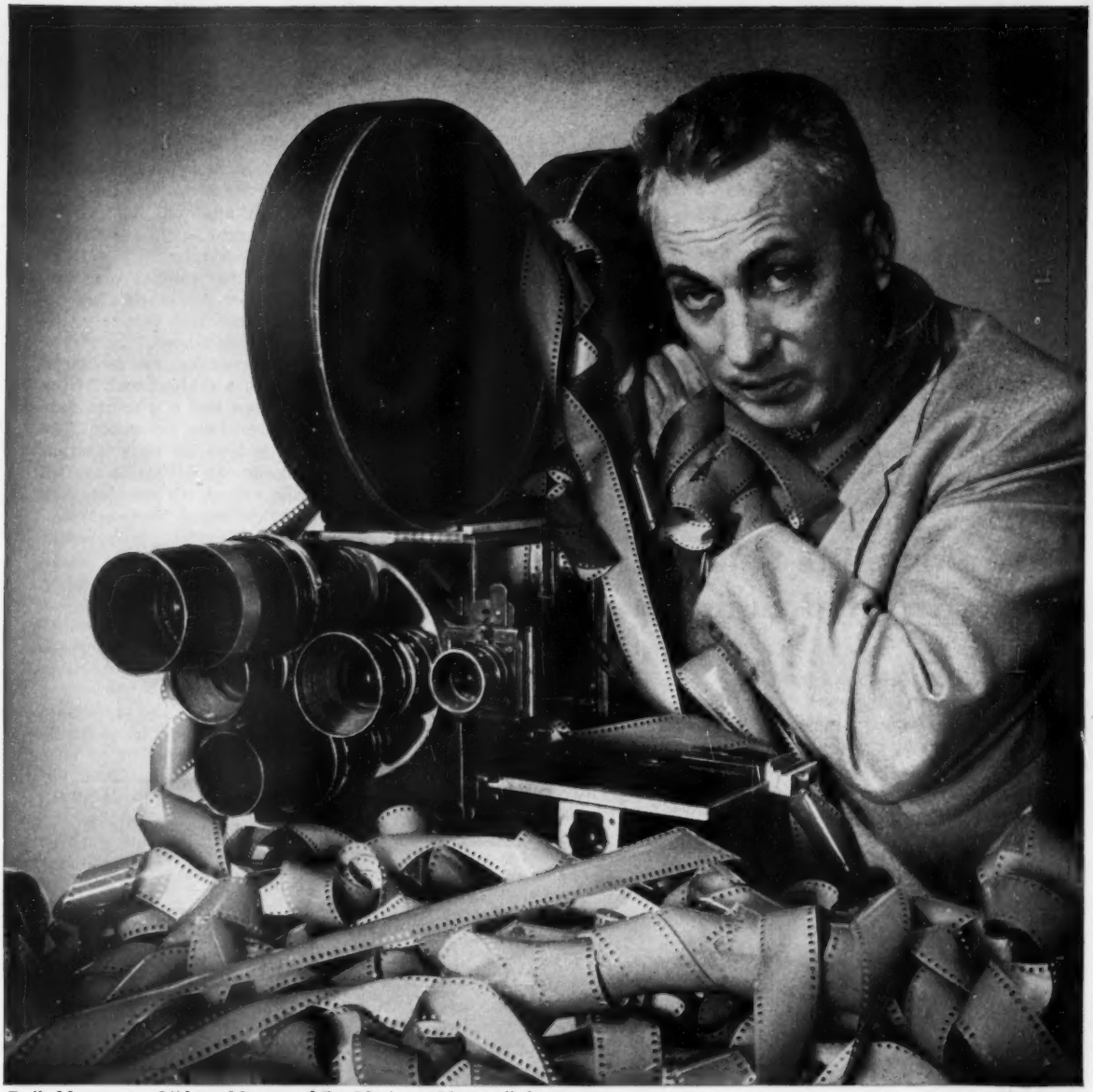


Emile Montemurro, Midwest Manager of Fox Movietone News, tells how:

He handles 300 reel problems a day!

"Old news is no news," says veteran newsreel cameraman Emile Montemurro.

"We've been getting the news to theaters and TV stations all over the U. S. — news that's hot and fresh — by using Air Express. We've relied on them for over 25 years.

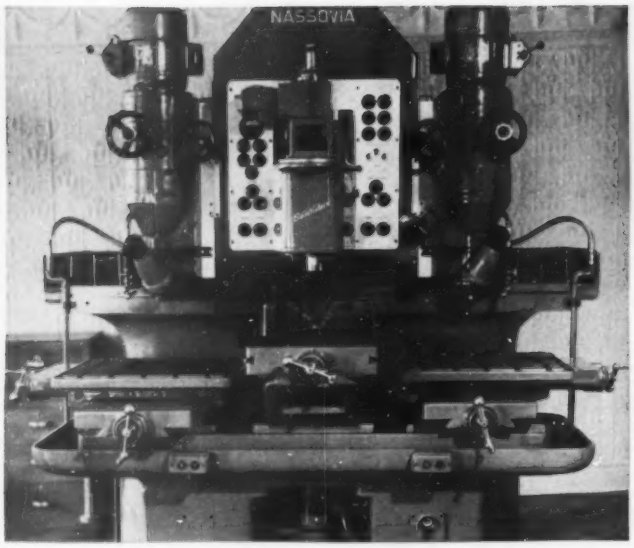
"Air Express handles some 300 shipments a day for us. They go all over the country, coast to coast. With new TV stations opening and using our newsreels, that figure will soon reach 600 a day!

"Other air services would cost us more than Air Express, we've found. Besides, you cannot duplicate the excellent personal attention Air Express gives every shipment."

It pays to express yourself clearly. Say Air Express! Division of Railway Express Agency.

Air Express

GETS THERE FIRST *via U.S. Scheduled Airlines*



Two-Spindle Die Sinker Has Electro-Hydraulic Control

Nassovia die sinker, developed in West Germany, is reported to be capable of copy-milling every contour, including stepless tracing of vertical walls. Machine can be hand controlled or set for fully automatic operation. Spindle speed is infinitely variable from 150 to 2900 rpm. Working range of the cutter heads is 31 in. longitudinally, 16 in. transversely, and 5 in. vertically; feed in all three dimensions is infinitely variable throughout hydraulically controlled working stroke of 1 to 31 in. Independent motion of each cutter head allows swivelling to 30° from vertical.

The basic machine has a continuous rigid table on a common base plate. Compound tables, which can be adjusted longitudinally and transversely, can be attached below milling spindles and adjusted to align workpieces to master. Third table, adjustable transversely, can be placed between these tables for alignment of master. Size of worktable is 59x24 in.

The hydraulic tracing attachment is fitted between the two milling spindles. The tracer pin, permitting parallel movement in all directions, is incorporated in the tracer head and directly coupled to the hydraulic control piston. The electro-mechanical mesauring and pre-selecting attachment continually measures the tangent at each point where it touches the master. Tracer attachment automatically controls the hydraulic feed in two directions; movement in the third dimension is produced by adjustable feed or hand feed.

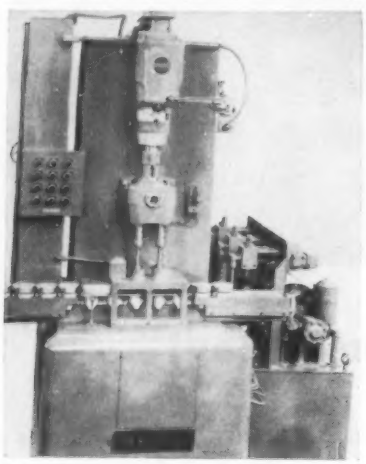
The tracer acts simultaneously as tracing, measuring, and controlling element. Every deflection of the tracer is followed by a feed movement of the work slide. During idle running, tracer performs small circular movement of the cutter, producing a circular movement in the work slide. When interrupted by the master, the tangent is measured in relation to the point of contact. The tracer is set into appropriate advanced position and initiates movement by means of hydraulic valves. It is thus lightly pressed against the master at an angle of 30° to the measured tangent. This allows the tracer to glide steplessly along the master, at a low contact pressure, with the cutter following. In this manner even dies with vertical walls can be steplessly traced.

When, for example, the advanced tracer touches a vertical wall of the master it stops and the work slide and cutter continue for about 1/30 sec, at which time the back position is reached and the hydraulic control valves are closed to complete the horizontal movement. The electrically controlled measuring attachment simultaneously moves the advanced tracer upwards to produce a movement of the work slide and cutter corresponding to the vertical wall.

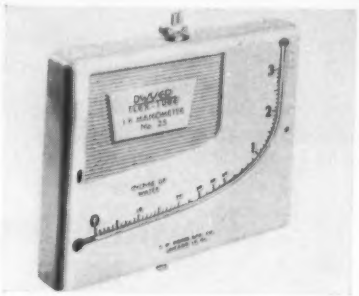
Hydraulic control elements are enclosed in the tracer head housing. Electrical pushbutton controls are located at the front of the cross-slide with the electric control panel inside the bed of the machine. The oil tank with feed control pumps, filters, and pressure valves are accessible at the rear of the upper frame section.

Tolerances reported for machine performance are ±0.004 in. with surface finishes of 80 to 200 mu-in.

Imported by Carl Hirschmann Co, Inc, 30 Park Ave, Manhasset, NY

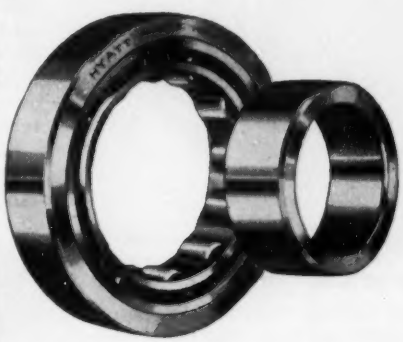


PISTON-MILLING MACHINE, 3-station transfer-type, produces 1400 pieces per hour. Hydraulic mechanism takes pistons from automation system and transfers them two at a time into position under milling spindles. Pistons are automatically clamped and limit switches activate the milling spindles. A vacuum system removes chips after machining operation and deposits them in tote tray — *Turner Bros, Inc, 2625 Hilton Rd, Ferndale, Mich*

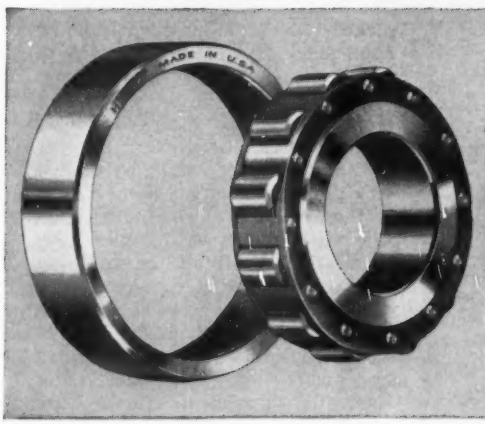


FLEX-TUBE GAGE for plus, minus, and differential readings will serve as air filter gage, static pressure indicator, draft gage, or air velocity meter. It is equipped with a plunger-type oil level adjuster. Ranges are 0 to 3 in. and 0 to 7 in. water. It is also available in a direct-reading velocity model for use with pitot tube, ranges 0 to 7000, 0 to 10,500 fpm. Unit is housed in molded plastic and furnished complete with tubing and fittings — *F W Dwyer Mfg Co, 317 South Western Ave, Chicago 12, Ill*

3 ways to handle your RADIAL LOAD PROBLEM

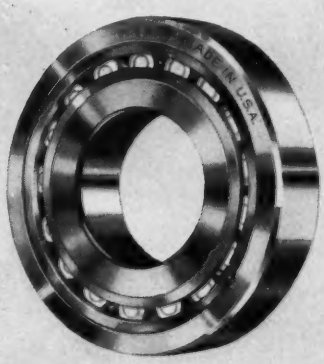


1 If your design requires a large shaft diameter to produce greater rigidity without disturbing boundary dimensions, a separable inner race type Hyatt Hy-Load bearing can be used with the inner race omitted. Rollers operate directly on a suitable hardened and ground shaft.



2 When the housing bore must be kept to a minimum, a Hyatt Hy-Load bearing with a separable outer race can be used—with the outer race omitted. The rollers then operate directly in a housing bore of suitable hardness and finish.

If your design applications involve radial loads, the best way to handle the job is with Hyatts—for Hyatt offers industry's most complete line of straight radial roller bearings! Hyatt Hy-Loads, for example, are made in three diameter series and two basic widths, to standard dimensions. There are ten major types—for the heaviest radial loads, and light or intermittent thrust loads. Four have separable inner races, two have separable outer races and four are non-separable, thus permitting wide flexibility in design and assembly procedures. Write for our general catalog No. 150—it will put the solution to any roller bearing problem at your fingertips. Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.



3 For designs requiring a bearing installed as a unit, there is the non-separable type of Hyatt Hy-Load. Whether you select a separable or non-separable type of Hyatt Hy-Load, they are available in a wide range of sizes.

HYATT

STRAIGHT ROLLER BARREL ROLLER TAPER ROLLER

ROLLER BEARINGS

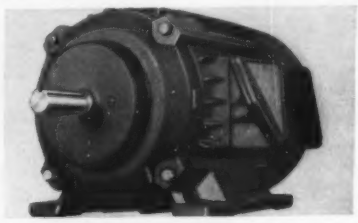
Apron Conveyors

Line of piano-hinged apron conveyors in three pan types, four chain pitches, and four basic assemblies has been introduced for a wide variety of applications. Pans are interlocked at articulation point to provide minimum opening and a smooth joint, and to prevent material from seeping through.

Conveyors carry castings, stampings, scrap, and chips horizontally, up and down inclines as steep as 45°, and in combination of these paths. Flat or semi-flat pans are suitable for horizontal or slightly inclined runs; pusher bars permit operation on steeper inclines. Deep bucket pans are used for steepest inclines and for handling large capacities. Available in widths from 12 to 48 in., they can be made in steel, stainless, aluminum, or other materials.

Apron line can be driven four ways: full chain and rollers on both sides for long runs, steep inclines, and heavy loads; half chain and rollers on both sides, with sides of pans used as inside links of chain; no chain, but with outboard rollers to support pans on rails; no chains and no rollers, for short conveyors with relatively small pull.

Link-Belt Co, 307 N Michigan Ave, Chicago 1, Ill

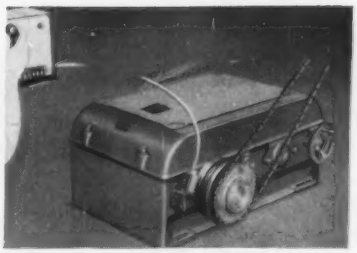


NEMA Standards Met By Reliance Motors

Reliance line of squirrel-cage induction motors includes protected and enclosed motors for all industrial purposes, designed to meet recent standards of NEMA. Research in the fields of new insulating materials, ventilation, heat transfer, and more efficient electrical designs has made possible greater horsepower in more compact space, and has led to better protection of motor windings, leads and bearings.

The first motors will be built for 1, 1½, and 2-hp. applications in frame sizes 182 and 184. The balance of the line to 30 hp will be introduced at regular intervals.

Reliance Electric & Engineering Co, 1088 Ivanhoe Rd, Cleveland 10, Ohio



Reeves Transmission With Electromagnetic Clutch

Combination of electric motion control and Reeves variable-speed transmission makes possible control acceleration, control deceleration, selection of operating speeds while machine is stopped, and jogging and inching. The combination results in unit needed in many processes to prevent damage to fragile material and protect expensive machinery. The load, whether light or heavy, is picked up with a smooth cushioned application of torque from zero to maximum, preventing undue jerks on the material being processed and absorbing backlash from gear trains, chains, or V-belt drives.

The electric clutch may be applied to either the input or output shaft of the transmission, depending upon the requirements of the particular application. To obtain the operating feature of selecting running speeds while the machine is stopped, clutch must be on output shaft. Rate of torque build-up is easily adjusted and controlled automatically or manually through separate control panel.

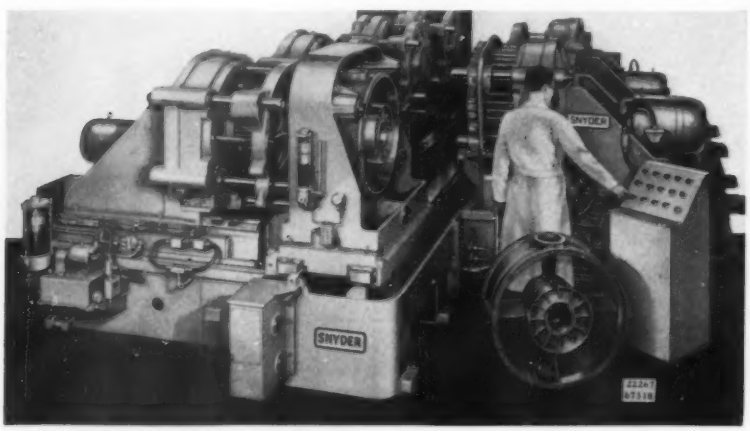
Additional information is contained in manufacturer's bulletin G-537.

Reeves Pulley Co, Columbus, Indiana

Air Control Manifold

Republic air control manifold combines all the various units of a conventional air control setup, and eliminates fourteen pipe connections. All units are brought by manifolds close to the operator's working position. All necessary valves and regulators normally required to control airline pressure are combined in one bronze casting 9 in. wide. Installation time is greatly cut—only eight mounting bolts are necessary, and units are interchangeable for simple maintenance. Although specifically designed for presses, arrangement of controls in this unit makes it useful in controlling and regulating air service in many other types of circuits, including automation auxiliaries.

Republic Mfg Co, 1930 W 77th St, Cleveland 2, Ohio



AUTOMATIC 4-station machine drills a total of 140 holes, and reams and chamfers as required, in an aircraft part of cast aluminum alloy 32 in. in diameter and 12 in. deep. Part consists of outer drum and central boss joined by four ribs. After loading at station 1, left head drills 18 holes in central boss flange. Both left and right head perform drilling, reaming and chamfering operations at stations 2, 3, and 4. The machine features a chain-index mechanism driven by a hydraulic motor and moves the fixture through the four work stations. HSS tools are used at 250 sfm with various feed speeds. Lubrication is supplied by automatic system. Production rate is six pieces per hour — *Snyder Tool and Engineering Co, 3400 E Lafayette, Detroit 7, Mich*

HERE'S WHY and WHEN

Four of the complete line of Hannifin lever-type Air-Operated Presses that include over 30 basic models in capacities up to 18 tons.

WE RECOMMEND

HANNIFIN AIR PRESSES

. . . ***for Production Operations*** involving assembly, marking, staking, riveting or punching of small parts. Hannifin ½ and 1-ton air presses are fast, safe and economical . . . in both initial cost and operating cost.

. . . ***for Bigger Pressing Operations*** where infrequent use would not warrant the purchase of a hydraulic press. Hannifin lever type air presses are low in first cost . . . assure efficient, uniform work . . . are far more economical to operate than out-moded manual presses.

Select the press you need from the complete Hannifin line of air presses. All operate off ordinary shop air supply. There are over 30 basic models from which to choose, many for either bench or floor mounting. Capacities range from ½-ton to 18 tons . . . ram strokes up to 15 inches . . . daylight to 46 inches . . . reach to 12 inches.

Hannifin Series M ½ and 1-ton Air Presses. Supplied with or without electric valves for push button operation.

Hannifin Series A ½ and 1-ton Air Presses. Notice these have adjustable gap.

Hannifin Representatives Are at Your Service in These Leading Industrial Centers

Atlanta, Buffalo, Cincinnati, Cleveland, Dallas, Dayton, Denver, Detroit, Houston, Los Angeles, Milwaukee, Minneapolis, Moline, New Orleans, New York, Philadelphia, Pittsburgh, Richmond, Va.; Rochester, N. Y.; St. Louis; Seattle; South Bend, Ind.; Washington, D. C.; Worcester, Mass. In Canada: TEM Sales Company, Limited, Toronto and Windsor.

HANNIFIN

Hydraulic Presses • Pneumatic Presses • Hydraulic Riveters
Hydraulic Cylinders • Air Cylinders • Air Control Valves

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1117 S. Kilbourn Ave., Chicago 24, Illinois

Please send me Bulletins 250, 251 and 252 on Hannifin Air Presses.

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Position.....

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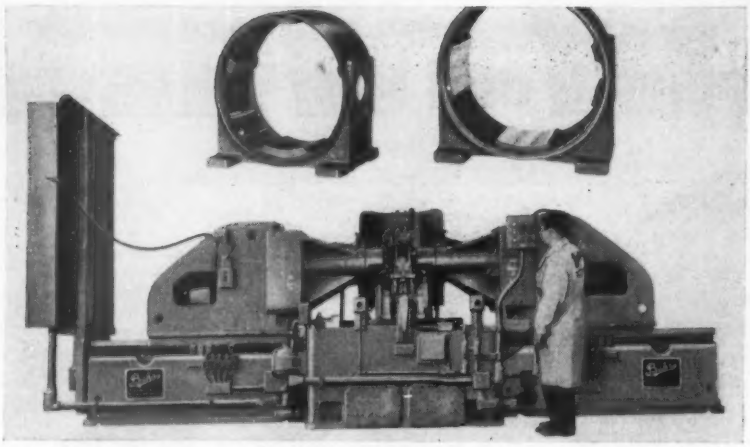
Address.....

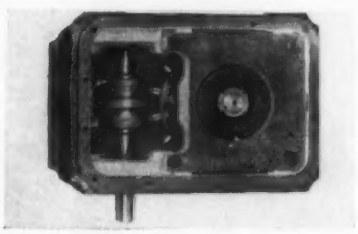
City.....*State*.....



BUHR SPECIAL 3-way boring, facing, and tapping machine processes eight different stator frames at rate of 60 pieces an hour. Previous operation, on another Buhr special, drills and reams the four legs and drills the four conduit box holes. This machine automatically indexes 180° and two opposing spindles finish-bore stator hole and face rabbet bores, simultaneously tapping four conduit box holes with tapping unit mounted in rear. Features include: laminated tool-steel ways, hardened and ground; automatic way lubrication; tapping spindles of lead-screw type; electrically controlled indexing table to assure uniform acceleration and deceleration; components located by dowels; hydraulic and electrical installations to meet JIC standards—*Buhr Machine Tool Co, Ann Arbor, Mich*

Ultra-fine-grain industrial X-ray film, known as Type 510, has been developed for use at low voltages (10-20 peak-kv) to examine low-opacity materials, such as aluminum and magnesium. With million-volt X-ray, or betatron equipment, it may be used to examine steel up to three inches in thickness. Particularly recommended for use where every minute detail is desired, such as detection of tiny flaws in spot-welding in aluminum sheeting.

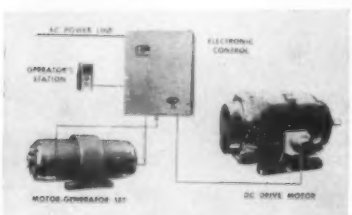
Du Pont Photo Products Dept, E I du Pont de Nemours & Co, Wilmington, Del



Roller Gear Drives

Ferguson Roller Gear Drives are available as completely housed units in a wide range of standard and semi-standard models for most indexing requirements. They offer selective assembly for any combination of directions of rotation, and for location of shaft extensions. Mounting arrangements permit the units to be mounted in any position and fastened by any of five sides.

Roller Gear Div, Ferguson Machine and Tool Co, Box 191, St Louis, 21, Mo



Master Variable-Speed Drives Are Electronically Controlled

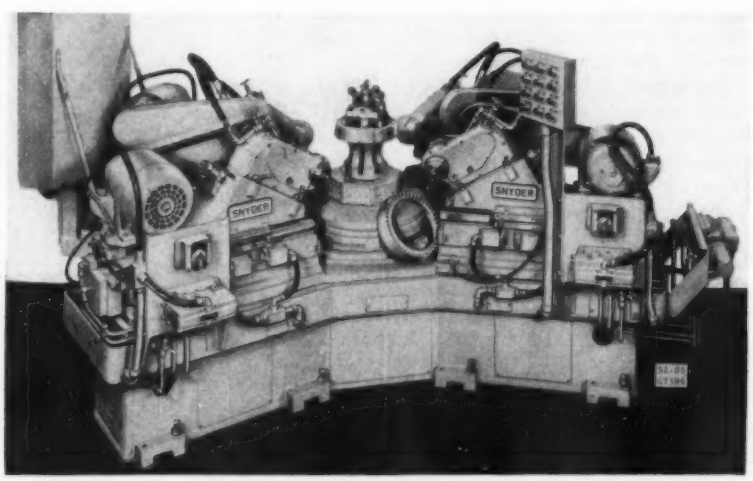
A line of electronically controlled variable-speed drives, ranging from ⅛ to 10 hp, permits speed to be made responsive to signals based on speed, load, current, voltage, pressure, light, temperature or time. Three or two-phase ac power is converted by motor-generator set and electronic rectifiers to supply dc variable-speed shunt-wound motor.

The units reportedly feature smooth starting, fast stopping, wide range of operating speeds, constant torque over entire speed range, good speed regulation and infinite-step speed adjustment which can be set either when running or stopped. Basic speeds are 2400, 1750 and 1150 rpm. Drive speeds are adjustable down to 1/6 of basic speed for continuous duty at 50 C, and to 1/10 of basic speed for intermittent duty.

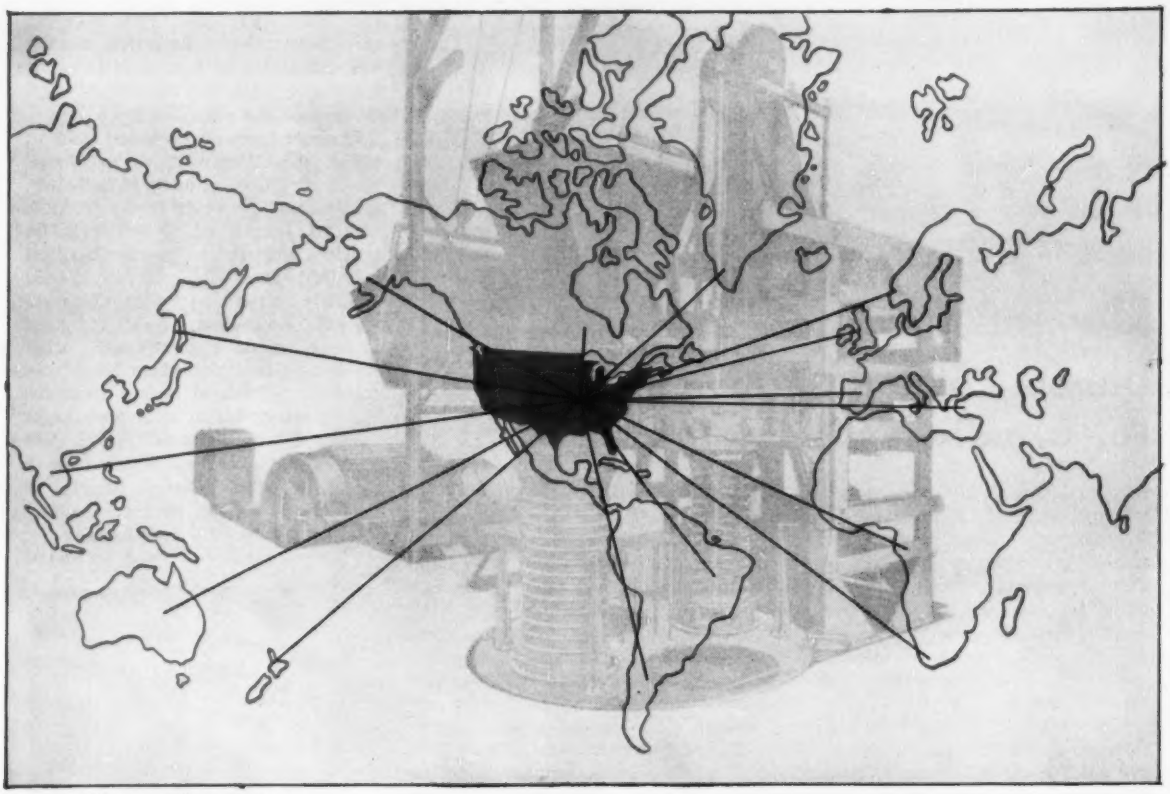
Remote, stepless speed control is provided at operators' station; control cabinet contains tube rectifiers, motor starter, protective relays and other elements. Motor-generator set and dc drive motor are Master standard, open, drip-proof, ball-bearing construction.

Line also includes speedrangers in which no motor-generator set is used —single-phase ac power is converted directly by tube-type electronic rectifiers.

Master Electric Co, 127-34 Davis Ave, Dayton, Ohio



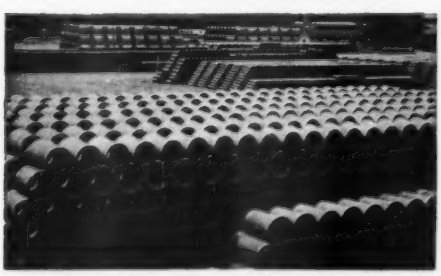
SPECIAL 4-WAY MACHINE mills eight slots in a circular part of cast aluminum alloy with automatic cycle. Part is loaded on fixture which oscillates through a 90° arc. Tools are HSS with feed rate of 32 ipm and speed of 350 sfm. Feed is hydraulically controlled; drive to spindles is through V-belt and gears. Product on rate is 72 pieces per hour—*Snyder Tool & Engineering Co, 3400 E Lafayette, Detroit 7, Mich*



From Sioux City, Iowa:

CITIES SERVICE OILS AND GREASES SENT ALL OVER THE WORLD WITH McCRACKEN MACHINES!

"OUR FINISHED MACHINES are completely serviced with Pacemaker 2 hydraulic fluid, Optimus 4 oil in the transmission and Trojan M for bearing grease."



CORRUGATED CONCRETE PIPES, used for sewer, culvert and irrigation work, are one of industry's most vital tools. McCracken Machines make the very finest.

ONE CITIES SERVICE PRODUCT SOLD MANUFACTURER ON THE COMPLETE CITIES SERVICE QUALITY LINE!

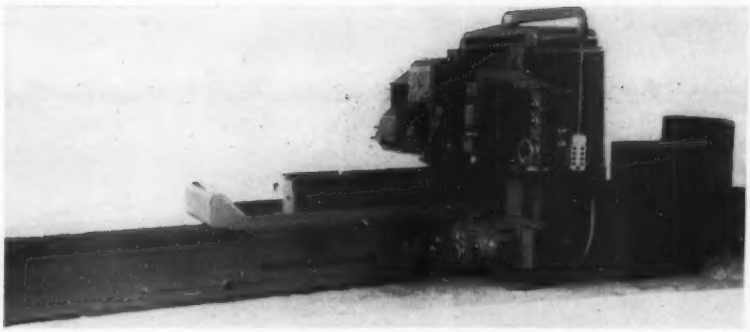
During the early part of World War II, Concrete Pipe Machinery Co., manufacturers of McCracken Machines, called in a Cities Service Lubrication Engineer for answers to some tough metal-cutting problems. On his recommendation, they tried Cities Service Cutting Oil, Chillo 93. Finished work was so improved and tool life so prolonged, that Concrete Pipe had a complete lubrication survey made of their plant.

THIS CAREFUL SURVEY PROVED THAT THE COMPLETE CITIES SERVICE LINE COULD DO THE BEST JOB FOR THEM. Electric motors, spindles, gear reducers, air compressors . . . drilling, grinding, machining of cast iron parts, threading, tool and die work . . . hydraulic systems, bearings, transmissions . . . Cities Service Industrial Oils, Greases and Cutting Oils did better on every job! Concrete Pipe Machinery Co. says: "They are giving us outstanding service, and availability and delivery have always been excellent."

If you'd like to talk to a Cities Service Lubrication Engineer, write Cities Service Oil Company, Sixty Wall Tower, New York 5, New York, or call the office nearest you.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS



Double-Column German Machine For Grinding Machine Tool Beds

Schmaltz Type APF double-column way grinders, which can also be used as regular surface grinders, are available in four sizes ranging from 31½ in. to 59 in. in grinding widths, 59 in. to 26 ft. 3 in. in grinding lengths, with a standard grinding height of 39 in. They are powered by motors up to 30 hp and accommodate pieces up to 17,600 lb.

High table speeds and rough peripheral grinding with profiled wheel are said to contribute to maximum efficiency. Peripheral grinding is employed by means of a 24-in. dia. profiled wheel mounted on a horizontal spindle. A hydraulically operated straight-and profile truing device is provided on the main wheelhead carriage. Speeds of the reciprocating table run up to 100 fpm.

Main grinding wheelhead, together with auxiliary swiveling wheelhead is mounted on the main carriage. Auxiliary wheelhead can be swiveled 60° both ways and, like the main wheelhead, slides on vertical guideways. Vertical movements of the two wheelheads can be controlled individually. To grind lateral guideways, machine can be equipped with one or two sideheads on either or both columns. Balancing gear arrangement drives the two leadscrews in two columns simultaneously to insure even rates of travel.

Imported by Parker Machine Co, Inc, 158 Pioneer St, Brooklyn 31, NY

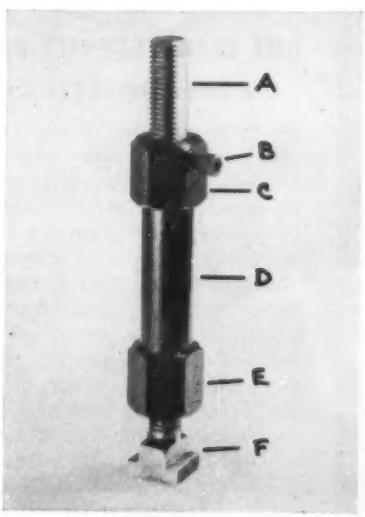
Abrasive Cloth Belt

Three-M-ite Multicut cloth belt is a heavy-coated abrasive product said to combine the polishing characteristics of hand-coated glue and grain setup wheels and belts. Heavy mineral build-up opens up under work pressure, presenting fresh abrasive grain particles to the work. Polishing is reportedly accomplished with higher color and less wild strikes. Belt is available in grit 60 and 150 aluminum oxide mineral in all standard widths and lengths.

Minnesota Mining & Manufacturing Co, 900 Fauquier St, St Paul 6, Minn

Pigmented phenolic resin finishes, called Parcolac 101 Black and Parcolac 102 Aluminum, are available for use over Parco Compound. Both products are said to have excellent corrosion resistance; production pieces finished with Parcolacs have withstood 100 hours in salt spray.

Parker Rust Proof Co, 2169 E Milwaukee Ave, Detroit 11, Mich



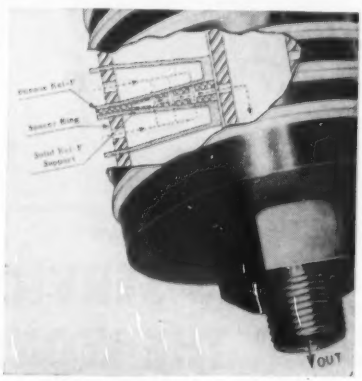
Techno T-slot Bolt Has Adjustable Length

Q-bolt, orginally intended for use in T-slotted machine tables, consists of steel tube (D) with hex ends, each threaded ID. End (E) receives T-slot bolt (F); and (C) receives threaded stud (A) with two parallel flat sides. ID of hex end (C) has two matching grooves milled through threads.

Quarter turn on threaded stud in either direction engages or disengages thread from body of bolt, permitting stud to move freely in tube. Overall length of Q-bolt can be quickly adjusted to precise position required. Once engaged, stud is held securely in position by thumb-screw (B) which need be finger-tight. Made throughout of high-strength alloy steel, bolt is reported to have successfully withstood severe tests for tensile strength and wear resistance.

Four Q-bolts in the different sizes will extend over any length from 8 to 42 in. The effective length of standard bolts can be increased by threading two or more together.

Techno Products, Inc, Cleveland



Filter Resistant to Fuming Nitric Acid

Filter medium is porous Kel-F, completely resistant to common acids and gases as well as common organic chemicals. The medium presents a large surface area, yet does not catalyze the decomposition hydrogen peroxide.

Standard elements will remove all particles larger than five microns in liquid and finer particles in gas, can be used at temperatures up to 350 F, and are resistant to thermal shock. The medium has a tensile strength of 900 psi and modulus of elasticity of 18,000 psi.

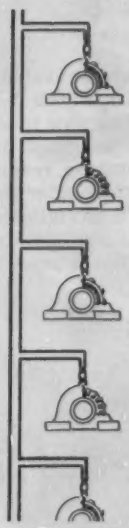
The illustrated filter provides one square foot of filter area in an envelope 5⅜ in. in diameter and 6½ in. long, and is designed for cleaning accessibility. It withstands 75-psi differential across the element and up to 1200-psi line pressures. Complete filters are available from fractional square foot surface area up to 50 sq ft.

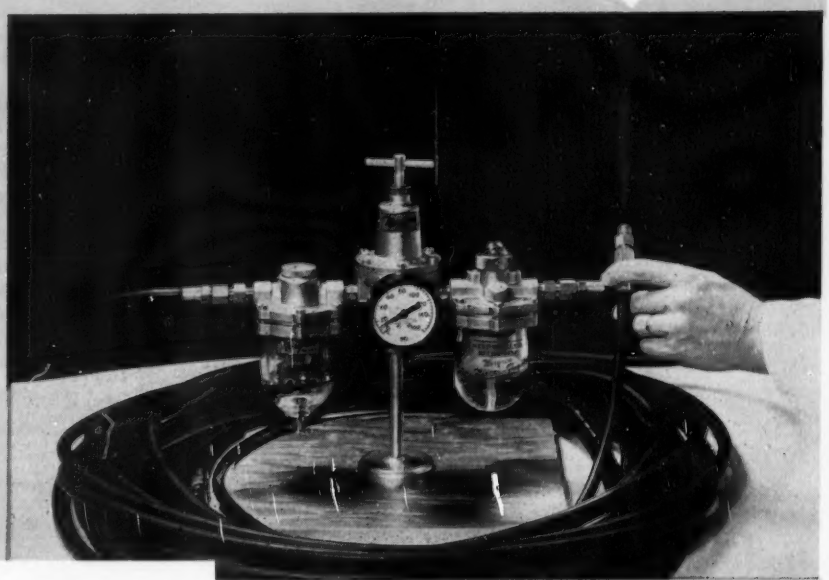
Porous Plastic Filter Co, Glen Cove, NY

TESTS *PROVE*

NORGREN MICRO-FOG

DELIVERS LUBRICATING FOG AFTER TRAVELING THROUGH 130 FT. OF HOSE





One of the many important advantages of Norgren Micro-Fog is its ability to travel longer distances...a feature which assures absolutely uniform distribution of lubricant through as many as 40 outlets. This reduces lubrication costs and permits greater flexibility in product design and plant layout.

PIONEER AND LEADER
IN OIL FOG LUBRICATION
FOR **26** YEARS

VALVES • FILTERS • REGULATORS
LUBRICATORS • HOSE ASSEMBLIES

FEATURES OF NORGREN MICRO-FOG LUBRICATORS FOR BEARINGS • GEAR BOXES • CHAIN DRIVES

- **VISIBLE OIL FEED**
- **CONSTANT OIL LEVEL**
  Rate of feed is not affected by oil supply.
- **OIL FEED CONTROLLED BY AIR**
  Gives accurate control and uniform rate of feed.

WRITE FOR NEW CATALOG No. 600

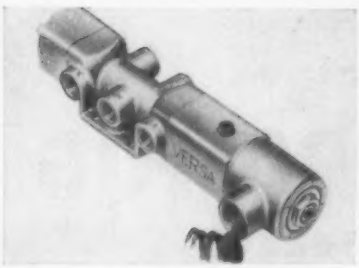
Micro-Fog Lubro-Control Unit for bearings, spindles, gear boxes.

Micro-Fog Lubro-Control Unit for tools and cylinders requiring regulated air pressure.

Vitalizer Unit for tools, cylinders, etc.

Micro-Fog Lubricator, tank type, 1¾ gal. cap.

C. A. Norgren® CO.
3436 So. Elati, Englewood, Colo.



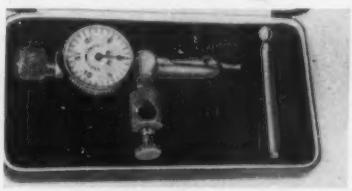
Versa Solenoid Valves

Electrical operation of the Versa line of 2-, 3-, and 4-way valves in ⅛ through ½ NPT sizes is possible through the development of a solenoid actuating device. It is of the secondary pilot-operating type in which relatively small solenoid controls pilot cylinder in valve. The valves may be repositioned by spring return, hand, cam, pilot, or foot, or second solenoid.

Four-way double solenoid valves may be spring centered with numerous arrangements of pressure spools which control flow. No additional line is required for solenoid pilot cylinder when Versa solenoid valves are used for pressures up to 150 psi. Pressures to 500 psi require an auxiliary low-pressure line of 35 to 150 psi.

One of the features of the Versa valve is the anti-extrusion arrangement of all kinetic O-ring seals in each valve type. This makes it impossible to cut seal rings in a normal operating pressure range. These valves have threaded ports plainly marked to facilitate installation. Transverse flow area in all types corresponds to pipe size.

Versa Products Co, Inc, 249 Sholes St, Brooklyn, N Y



Gem Dial Indicator

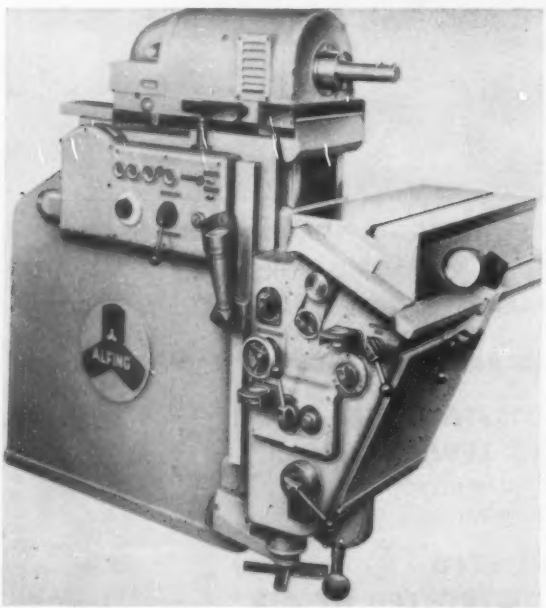
Gem dial indicator, manufactured by the Hairspring Vibrating Company is reported to be extremely rugged, sensitive, smooth operating. The unit, No. 222, is said to provide two constant repeat readings regardless of direction, even under such adverse conditions as outside vibrations. The spirals are manufactured with a special grinding process and plated and polished to insure fine action.

Indicators are finished with No. 9 standard contact points and adjustable and removable ball shank. Special contact points No. 10 and 30 allow readings in small and difficult places. The instrument is reportedly adaptable for use on nearly every type of machine. Price of the unit is $19.50.

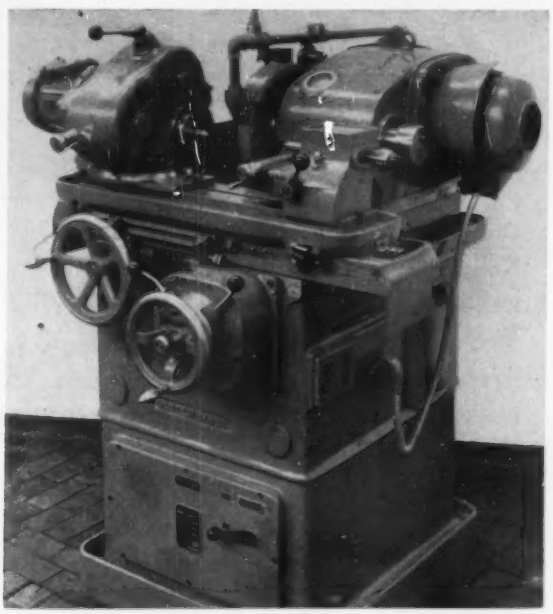
Hairspring Vibrating Co, 406 32nd St, Union City, NJ

Manzel torque wrench is available with a capacity from 0 to 1000 ft-lb, for accurately tightening nuts to any predetermined stress. "Stay Set" dial accurately registers torque reading and remains at maximum after tension is released; thus a careful check of obtained tension is possible after pulling has ceased. Dial is reset by turning center knob.

Frontier Industries, Manzel Div, 315 Babcock St, Buffalo, NY

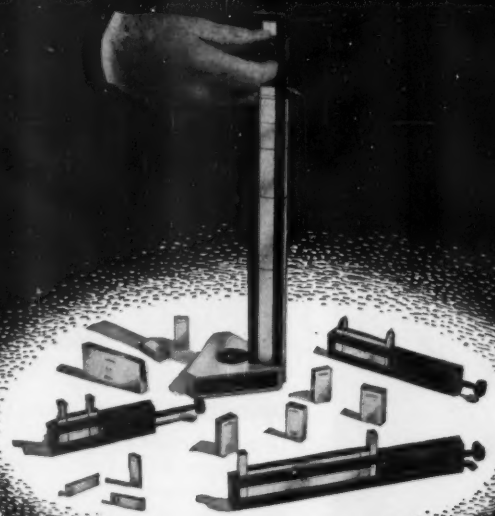


UNIVERSAL FINE BORER produces small and large runs without complicated fixtures. This is accomplished by arrangement of work table with optical settings. Height of knee and cross adjustment of table are combined with optical reading device for accurate setting. Feed movement of headstock slide and longitudinal traverse of cross slide are hydraulically controlled. Feed of headstock slide is infinitely variable from 0.236 to 12 ipm. The quick return movement takes place at 114 ipm. The actual hydraulic feed values can be read from feed indicator. Spindle speed of headstock is infinitely variable within range of 300 to 3000 rpm. — *Imported by Morey Machinery Co, Inc, 383 Lafayette St, New York 3, NY*



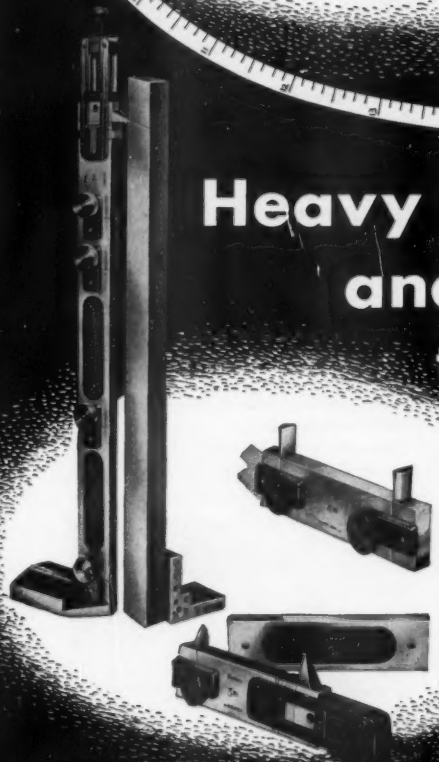
CYLINDRICAL GRINDING MACHINE, Fritz Werner Model 270A, is designed for 10-1¼-in. wheel and can grind up to 10 in. in length between centers. Workhead can be swivelled to 90° and is adaptable for dead center work, three-jaw 3½-in.-dia. chuck, or spindle-mounted collets. Spindle turns on hand-scraped bronze bearings force-lubricated by a built-in pump. Work table swivels 5° in either direction. Both grinding spindle and work head are driven by belts from individually mounted flange motors. Wheel infeed is operated from calibrated dial or ratchet lever, the latter arranged to advance the wheel slide by 0.0001 in. per tooth — *Imported by Marac Machinery Corp, 1819 Broadway, New York 23, NY*

Standard Webber Accessories
for Dimensions under 12"



WEBBER Standard Accessories are designed for use with standard Webber Gage Blocks and are recommended for measurement under 12". Gage block holders, jaws, center point, scriber and base can be combined into a variety of small gages for precision layout and inspection.

Heavy Duty Blocks and Accessories
for Dimensions over 12"



No workpiece too large, infinite range. Patented clamps, jaws, center point, scriber and base offer wide gaging application. Patented eccentric clamp squeezes blocks in opposite directions thus maintaining ± .000005" over entire buildup.

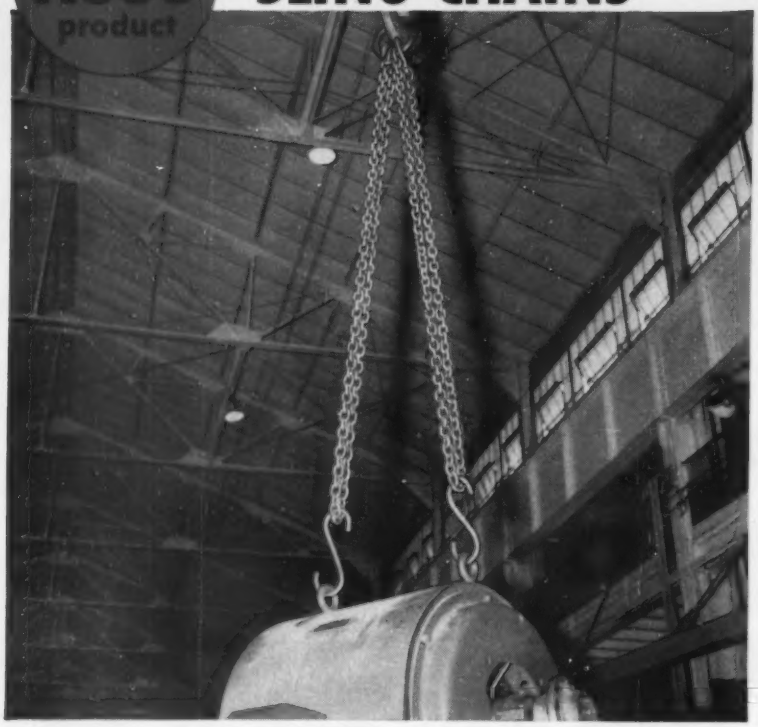
Webber
GAGE BLOCKS and ACCESSORIES

THE WEBBER GAGE COMPANY
12901 Triskett Road • Cleveland 11, Ohio

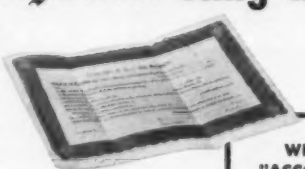
Largest exclusive manufacturer of precision gage blocks

an ACCO product

ACCO Registered* SLING CHAINS



You get more than chain when you buy ACCO Registered Sling Chains



• This 125,000 psi ACCO *Registered* alloy sling chain has great strength, yet it's lightweight and easy for men to handle. It will lift a variety of expensive loads safely over costly machines. You can be sure of that because it's ACCO *Registered.*

ACCO *Registered* is more than a name. It's more than a registered trade mark of American Chain & Cable. It is the standard by which all other slings are judged. It means that you can equip your shop with dependable "lifting tools" specifically designed for highest efficiency and long life by trained engineers who spend all their time designing and testing slings.

A survey of your sling requirements will cost you nothing. See your ACCO *Registered* Sling Chain distributor today or write our York, Pa., office for details. *Trade Mark Registered

WHAT "ACCO REGISTERED" MEANS . . .

1. The best material
2. Unit safety factor (on bodies, rings, links, hooks)
3. Proof test of complete sling to twice the working load limit
4. Actual field service test of each design
5. Metal identification ring on each sling
6. Signed Registry Certificate with each sling

ACCO

American Chain Division

AMERICAN CHAIN & CABLE

York, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, San Francisco, Bridgeport, Conn.

Hooks Rings Links

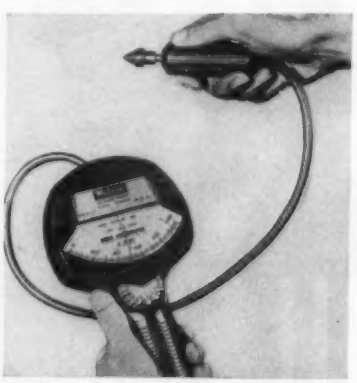
Denison Line of Direct-Operating Sequence Valves

Denison line of direct-operating controls includes a series of direct-operating sequence valves suitable for operations in circuits from 25 to 2,000 psi. This line is said to provide precision control for interlocked hydraulic operations and insures close synchronization of primary and secondary operations. Pressure setting of the valve is easily adjusted. When system pressure reaches pressure setting of valve, valve diverts oil to secondary circuit.

Pressure build-up in the system brings immediate action of the pilot piston in the secondary circuit which may be adjusted to shift at any pressure from 25 to 2,000 psi. The use of small pilot piston eliminates need for heavy spring loading at high pressures.

Response is said to be positive and control close.

The Denison Engineering Co, 1160 Dublin Rd, Columbus 16, Ohio



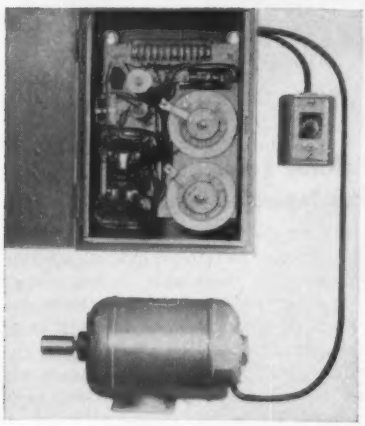
Metron Hand Tachometer Features Easy Reading

A thumb-operated range selector on the Metron hand tachometer automatically changes the scale numbers

for each range. The same mechanism brings into view the correct number of rpm per scale division and the extra long scale is subdivided for maximum readability. Other features claimed include: sustained high accuracy; long life; low operating torque; rapid response; permanent lubrication; rugged and light-weight construction.

Built-in calibration circuit provides positive check on performance. Different types of tachometers and range-extending adapters are available to measure speeds as low as 2 and as high as 100,000 rpm.

Metron Instrument Co, 432 Lincoln St, Denver 3, Colorado

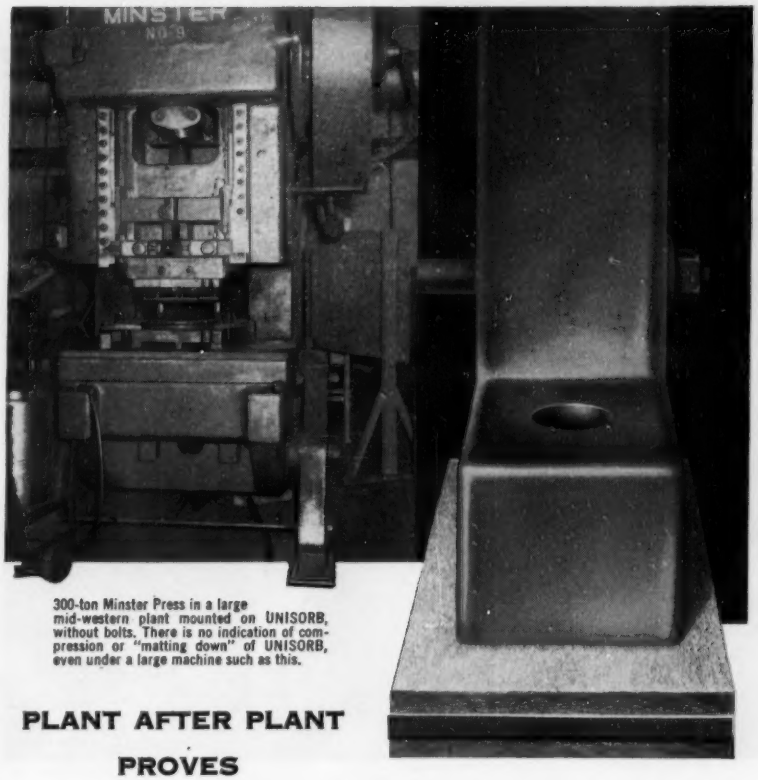


Vari-Amp Magnetic Amplifier Adjustable Speed Motor Drives

Vari-Amp magnetic amplifier motor drive is a compact, self-contained unit designed to provide adjustable motor speeds from an ac power source. It converts ac power from a 115-v, 60-c source to dc power used to drive a dc motor; speed is continuously adjustable over comple.e range by means of the small rheostat located on control station. Standard model provides for a speed range of 10:1 and is available with motors ranging in size from 1/40 hp up to and including ½ hp.

Unit consists of three components: the main control panel, control station, and motor. In addition to the variable armature supply, field supply, control circuit, short circuit, and overload protecton are included. Basic unit is provided with an on-off switch and speed-adjusting rheostat on the control station. Optional features include jogging, dynamic braking, and reversing.

Device employs a full-wave, self-saturating, magnetic amplifier unit containing neither tubes nor moving parts. Full-wave conversion permits use of a motor one frame size smaller



300-ton Minster Press in a large mid-western plant mounted on UNISORB, without bolts. There is no indication of compression or "matting down" of UNISORB, even under a large machine such as this.

PLANT AFTER PLANT PROVES THAT MACHINES LARGE AND SMALL SHOULD BE MOUNTED ON

UNISORB®

In addition to reducing transmitted machine noise and vibration up to 85%, UNISORB saves you time and money on installation.

You don't need bolts or lag screws with modern UNISORB machine mounting. No more holes drilled in the floors. You simply order the grade of UNISORB recommended for each machine, cement the pad to the machine base and floor, let the cement set and begin operation.

Return the coupon today for your copy of the book that shows how easy it is to use UNISORB mounting pads. The book also shows how UNISORB reduces transmitted vibration and noise by as much as 85%.

UNISORB is also available pre-coated with adhesive, for use with machines which do not require shimming.

Look for the red center and UNISORB brand mark

The **FELTERS** Company
200 SOUTH STREET, BOSTON 11, MASS.

Offices: New York, Philadelphia, Chicago, Detroit, St. Louis
Sales Representative: San Francisco
Mills: Johnson City, New York; Millbury, Mass.; Jackson, Mich.; New York City

RETURN COUPON NOW! At no obligation to me, please send a copy of "Why It Pays to Anchor Machines with UNISORB."

Name..... Title.....
(Please Print)
Company.....
Address.....
City..... Zone..... State.....
Return to: The Felters Co., 200 South St., Boston

PRESIDENT MEETS MONEY MAKER IN PRESS ROOM

Metal shop answers the $64 question with Farval...hits a $366,600 jackpot!

The Problem: Lubricating large presses by hand in an Ohio metal stamping shop would have kept four men busy with oil cans—a $64 labor expense per 2-shift day!

The Solution: Management installed Farval Centralized Lubrication on 26 presses in 1928, since then on seven more. The total investment in Farval was less than $20,000. For these 33 large presses, *only one oiler per shift* is needed. And as a surprising extra saving, oil consumption dropped from 15 gallons to less than 4 gallons a day!

Dramatic Payoff: Eliminating 3 hand oilers adds up to $312,000 in man hours saved in 25 years! Plus another $54,600 saved on oil! Total saving—$366,600. Even more important, Farval increases production by eliminating downtime for lubrication.

This example indicates the tremendous savings Farval provides on any industrial equipment—in man hours, lubricant, production time! Why not write for our Free Lubrication Survey to learn how Farval can help you?

WRITE for:
Free Lubrication Survey

Without obligation, we will send one of our lubrication engineers to inspect your plant equipment and to present a written analysis of what Farval can do for you.

Bulletin 26

Illustrated 20-page book tells the full story of Farval, how it works and how it can save you money.

FARVAL is the foolproof Dualine system of centralized lubrication that delivers a measured amount of clean lubricant at regular intervals to every bearing. From a central station, lubricant is pumped under pressure to a measuring valve at each bearing, delivering the exact amount of lubricant required.

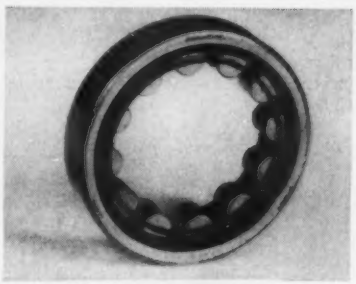
THE FARVAL CORPORATION

3254 East 80th St., Cleveland 4, Ohio

Farval is an affiliate of The Cleveland Worm & Gear Co. Represented in Canada by Peacock Brothers, Limited

than that required for half-wave units, since there is less heating on full-wave applications. No warmup period is required before applying the load, and maintenance requirements are said to be greatly reduced. Life expectancy of the unit is reportedly much greater than that of comparable units using electronic tubes.

Clark Controller Co, 1146 E 152nd St, Cleveland 10, Ohio



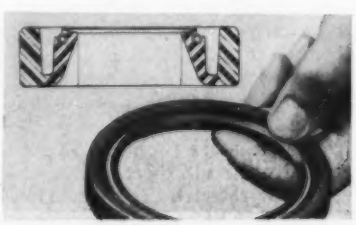
Rollway Roller Bearing Has Separable Inner Race

General duty steel-cage-type cylindrical roller bearing is available with or without separable inner race. Manufactured to conform with standard SAE bearing sizes, bearing is a self-contained roller assembly in an outer race. Its assembly consists of an outer race, roller retainer, and rollers.

The ID of the outer race has accurately machined ring grooves into which heavy L-section snap rings fit. The retainer is a one-piece steel pattern, having pockets with broad double flanges.

Depending upon the application, either type may be used though it must be recognized that if the inner race is not used the shaft that replaces it must possess the same finish and hardness characteristics.

Rollway Bearing Co, 542 Seymour St, Syracuse, NY



Line-Contact Design For Molded Oil Seals

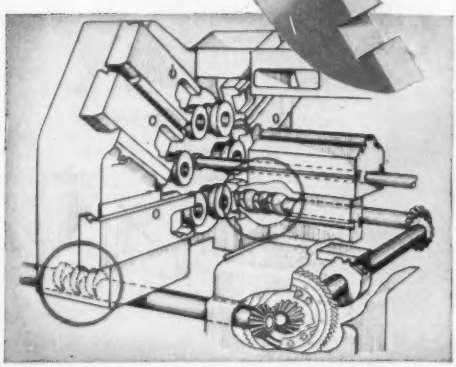
LPD Clipper Seal is a new design added to the Johns-Manville line of molded oil seals. LPD represents "Line-contact proportionate design." Line-contact refers to the lip of the seal which contacts the shaft in a

GREENLEE *Automatics*

INTERCHANGEABLE CROSS-SLIDE CAMS

On Greenlee Automatics, cross-slide cams are fully interchangeable—any cam can be used to move any cross-slide. Drive for the cams is arranged in such a way that the cross-slide travel is in a selected ratio to the travel of the main slide. Standard cams are available to provide a wide range of ratios.

In the average job shop, a set of only 15 standard cams will provide enough flexibility to take care of 90% of the jobs that will come through. Standard ratios range from 1½:1 to 8:1.

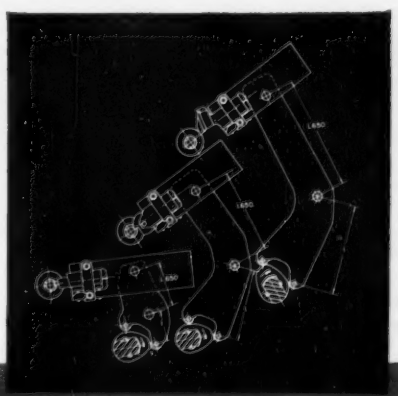


Simplicity of Design Promotes Production Efficiency

The distinctive Greenlee cross-slide cam design and operating features promote production efficiency on many short-run jobs because they reduce changeover time. In addition, there is an economy of investment.

As shown at the left, cross-slide cams are located at the sides of the machine, under the open ends of the cross-slide housings, where they are easily accessible.

As shown at the right, each cross-slide is operated independently by a separate cam, making it easier to split up operations and arrange better tooling set-ups.



Write for FREE Literature

PRODUCTION MACHINERY

GREENLEE

GREENLEE BROS. & CO.
1723A MASON AVE., ROCKFORD, ILL.

1 Sectional view shows the sliding cam-carrier on shaft with cam and lock-pin removed.
2 Cam slips easily into place on shaft with slots in alignment with keyways.
3 The sliding carrier with keys attached quickly locks cam in position on shaft.

What's in this NAME?

KENDEX*

It's the Trade-Name for Multiple-edge, Indexable, Tungsten Carbide Insert Tools Produced by Kennametal Inc.

EXCLUSIVE FEATURES

1. *Made of Kennametal*—Kendex inserts have its uniform high hardness and exceptionally long life.
2. *Multiple, precision-ground cutting edges*—enabling a clean, sharp edge to be kept against the work continuously.
3. *Screw-mounted*—can be accurately indexed to a new cutting position, in seconds, without removing tool shank from holder.

OPERATING ADVANTAGES

1. *Minimize downtime for tool changing*—major cause of high-cost operation.
2. *Eliminate tool grinding*—no regrinding; Kendex inserts are thrown away when all cutting edges have been used.
3. "Balanced" tool budget—it's penny-wise and pound foolish to "save" money by excessive reconditioning of old tools, when you can keep new cutting edges on the job continuously with Kendex inserts.

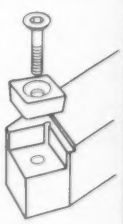
Ask your nearest Kennametal representative for details. Kennametal Inc., Latrobe, Pa.

How KENDEX* Works

1

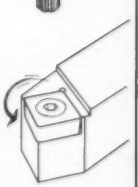
Hard, strong, wear-resistant Kennametal is molded into square, round, or triangular Kendex inserts, which are precision ground.

2



Kendex inserts are mounted to suitable tool holders with socket head screws.

3



When edge becomes dull, insert is turned to new cutting position. When all cutting edges have been used, insert is thrown away; no regrinding.

*Registered Trade-Marks

KENNAMETAL

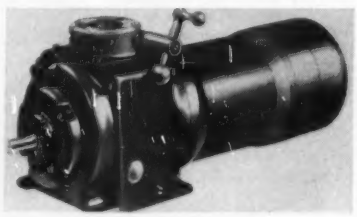
CEMENTED CARBIDE TOOLING THAT INCREASES PRODUCTIVITY

SALES OFFICES IN PRINCIPAL CITIES

thin line around the circumference. This results in minimum seal wear, low friction heat and less drag on the shaft. The narrow-lip bearing area reduces the need for lubrication to a minimum. Proportionate design refers to the relationship between lip area and hinge area which stays proportionately the same throughout the range of flange widths and shaft sizes. Sealing characteristics are constant whether seal size is small or large.

The flexibility of the hinge which controls lip contact enables the seal to adapt itself to shaft runout and minor shaft eccentricities. The lip area provides deep retainer groove for the garter spring to assure sealing effectiveness. The diameter and tension of the spring are carefully predetermined to maintain lip pressure at minimum necessary for proper sealing. The composition heel is designed for a press fit into the bearing cavity and is constructed of composition material to conform to irregularities.

Johns-Manville, 22 E 40th St, New York 16, NY



Variable-Speed Drive Has Built-In Brake Motor

Variable-speed drive is available with built-in magnetic disk brake motor in 42-48 frame. Unit provides instant stops as frequently required for indexing tables, welding positioners, and tensile and compression testers.

Ratings are from ⅛ to ¼ hp. Units are 5 in. in dia and less than 3½ in. in length and mount directly on end of motor to provide compact package of motor, brake, variable-speed transmission, and built-in reducer. Features include: external manual release, automatic reset mechanism; friction elements which eliminate lining wear adjustments and replacements; brake enclosure applicable to both open or totally enclosed motors.

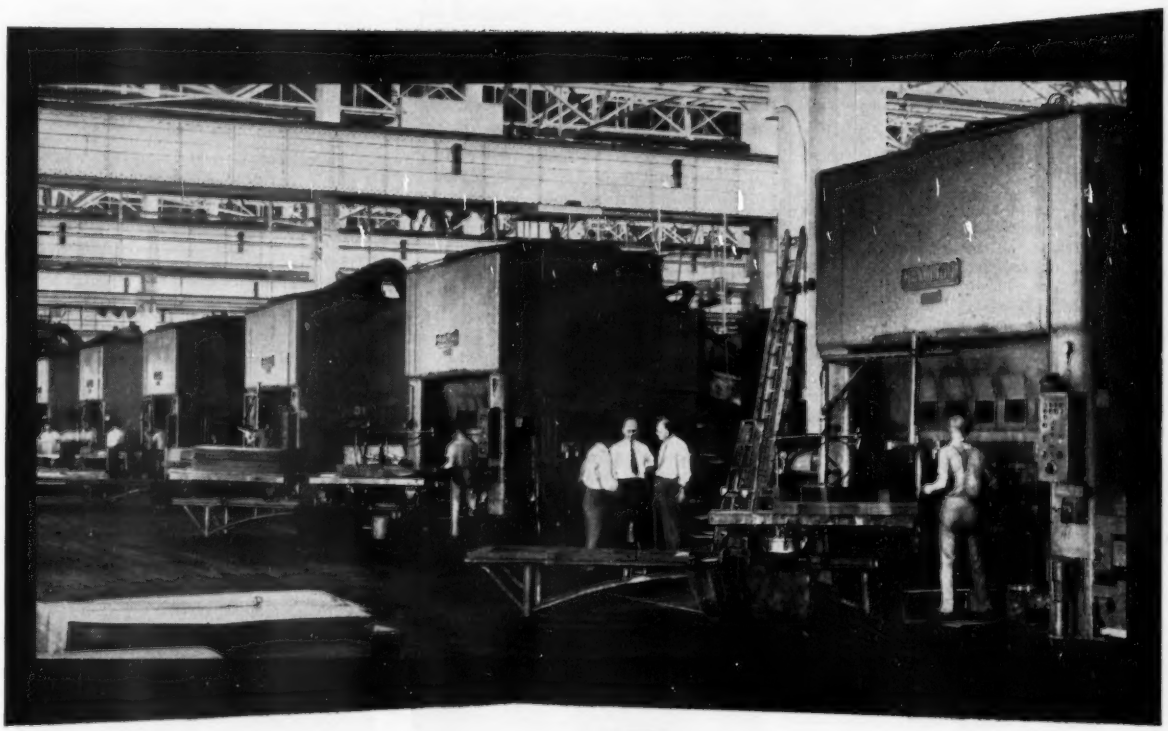
Transmission is available without motor and can be had with a variety of built-in reductions, both spur and worm types.

Graham Transmissions, Inc, Menomonee Falls, Wis

HAMILTON

TRIPLE and DOUBLE ACTION PRESSES

head more than three-quarters
of the master production lines in the
largest auto-body stamping plants



HAMILTON PRESS DIVISION
Curtis Building, Detroit 2, Mich.
Branch Offices: New York, Chicago
Factory: Hamilton, Ohio

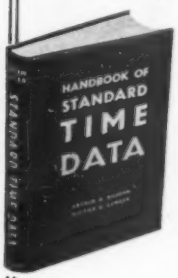
BALDWIN-LIMA-HAMILTON

To Boost Plant Efficiency . . .

HANDBOOK OF STANDARD TIME DATA

For Machine Shops

Arthur A. Hadden *and* **Victor K. Genger,**
McClure, Hadden & Ortman, Inc., Mgt. Engineers



JUST OUT — First one-volume source for all tested, detailed standard data needed for establishing machine shop time values. Provides separate tables for each common type of machine tool. Specifications for manual operations recognize such variables as weight of piece, transportation, etc. Recommendations for machining and tables for machine elements based on type of equipment, amount of material to be removed, etc. *87 forms, tables, 474 pages.* **$10**

INDUSTRIAL TRAFFIC MANAGEMENT

Newton Morton, *Kent State University;*
Frank Mossman, *Michigan State College*

ALSO NEW—Presented from the standpoint of the shipper and his problems, this new work gives a complete understanding of today's complex traffic rules, regulations, and structures. Covers in detail freight classifications and rates, storage and warehousing, loss and damage claims, rail and motor carriers, export-import shipments, etc. Discussions are highlighted with selected court cases and ICC decisions. *33 illus., 568 pages.* **$6.50**

PRINCIPLES OF INDUSTRIAL PSYCHOLOGY

Thomas Arthur Ryan *and* **Patricia Cain Smith**
—both of Cornell University

READY NOW—Sets forth established facts of industrial psychology, outlines its subject matter, describes its methods, and recommends procedures which may be applied to a wide variety of special problems in industry. Discusses the theory of human motivation, recent research into worker motivation, and factors of boredom and fatigue. Offers practical suggestions to help step up efficiency, select and place personnel. *58 illus., 600 pages.* **$5.50**

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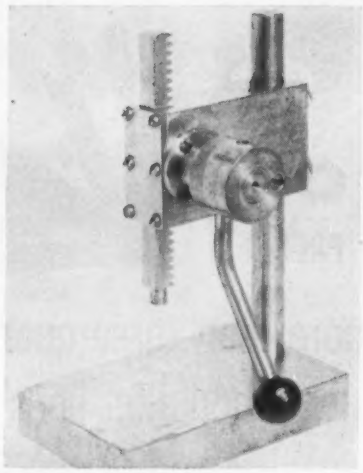


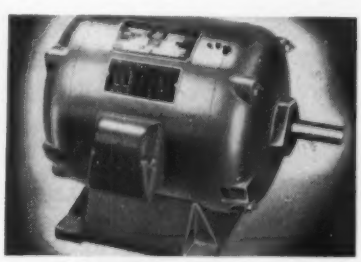
Adjustable Release Clutch Feature of Arbor Press

The Vari-Press, a small arbor press, equipped with an adjustable pressure release clutch, was designed for manual assembly of small parts. The ram pressure obtainable ranges from zero to 100 lb. Adjustment of the ram pressure is obtained by increasing or decreasing the tension on the adjusting screw located on the outside face of the clutch assembly.

Operation procedure: adjust ram pressure release screw to suit work; when ram reaches pre-set pressure, clutch will release; continue movement of handle for one complete revolution when clutch will re-engage at original setting; reverse handle and remove work.

Press is constructed throughout of steel. Other features include adjustable head and ram take-up gibs.

Glenwood Machinery Associates Inc, 85 Chestnut St, Newark 5, NJ



Integral-Horsepower Motors Meet NEMA Standards

A. O. Smith Corporation has introduced a line of integral horsepower motors designed specifically to provide economical change-over to NEMA Standards. New motors will be offered in either the present or in new mountings. Initial production will be in the 1, 1½, 2-hp ratings. All performance characteristics

1 OPERATION INSTEAD OF 3

...an example of cost reduction through W&S tool design...

A large electric meter manufacturer asked us to design a single small precision tool to do in one operation the work formerly done in three. The double-ended tool we made to their product specifications cost just half as much as the three tools it replaced; it reduced production time; and it eliminated multiple error along with multiple set-up.

Woodruff & Stokes specialize in small tool design and manufacture. For example, supplying small cutting tools requiring diameter tolerance of ± .0002" or closer and as many as five cutting diameters is not unusual. Woodruff & Stokes have made these tools their business.

How can W&S help you? Write today for complete information.

WOODRUFF & STOKES CO.
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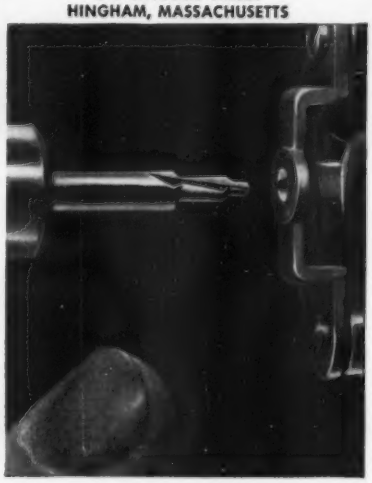
345 LINCOLN STREET
HINGHAM, MASSACHUSETTS

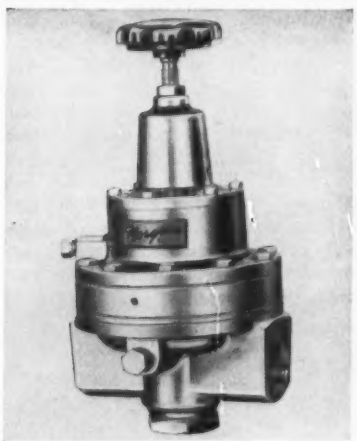


of the old and new motor lines will be equal; contour lines and styling will be the same.

Motors are composed of rolled steel main frame, designed to insure maximum ventilation to interior, yet meet requirements of drip-proof application. Rotor diameter fans are employed, blades being cast integral with pressure-cast end rings and rotor bars.

This new line will supplement present line which extends from ¼ to 150 hp and includes not only standard models, but mechanical and electrical variations. Included in these variations is a line of standard flange mountings, of vertical hollow shaft motors for turbine pumps, gear head motors of one through 15 hp., and many others.

A O Smith Corp, Box 584, Milwaukee 1, Wisconsin



Air-Pressure Regulator Has Wide Operating Range

Pilot-controlled air-pressure regulator was designed for extreme precision in air control over wide operating range. It reduces line pressures up to 400 psi to working pressures from 2 to 120 psi. The unit provides a pilot regulator and a pressure regulator in an integral unit.

Regulator air pressure controls delivered air pressure, minimizing the effect of fluctuating line pressure. Light adjusting spring in pilot control regulator makes regulation precise and eliminates heavy adjusting springs. Balanced valve construction provides accurate control and greater air capacity. It is available in ½, ¾ and 1-in. sizes.

Companion regulator with same operating features is available with remote control unit. The regulator can be located at any point in air system regardless of accessibility.

C A Norgren Co, 3436 So Elati, Englewood, Colorado

ONLY

GOSS *and* DeLEEUW

AUTOMATIC CHUCKERS

offer the 1-2-3 *feature*

This NEW development—unsurpassed for speed, convenience of tooling and precise finish—involves no retooling problem even for short runs. It assures greater production at lower cost on all classes of work.

The unique "1-2-3" feature, exclusive with Goss & De Leeuw, provides the means for performing one to three right or left hand single or double threading operations simultaneously or in sequence, without changing set up.

Here's an ideal machine tool for small lot requirements because of quick, easy changeover. Any class of chuck work can be handled economically in any quantity.

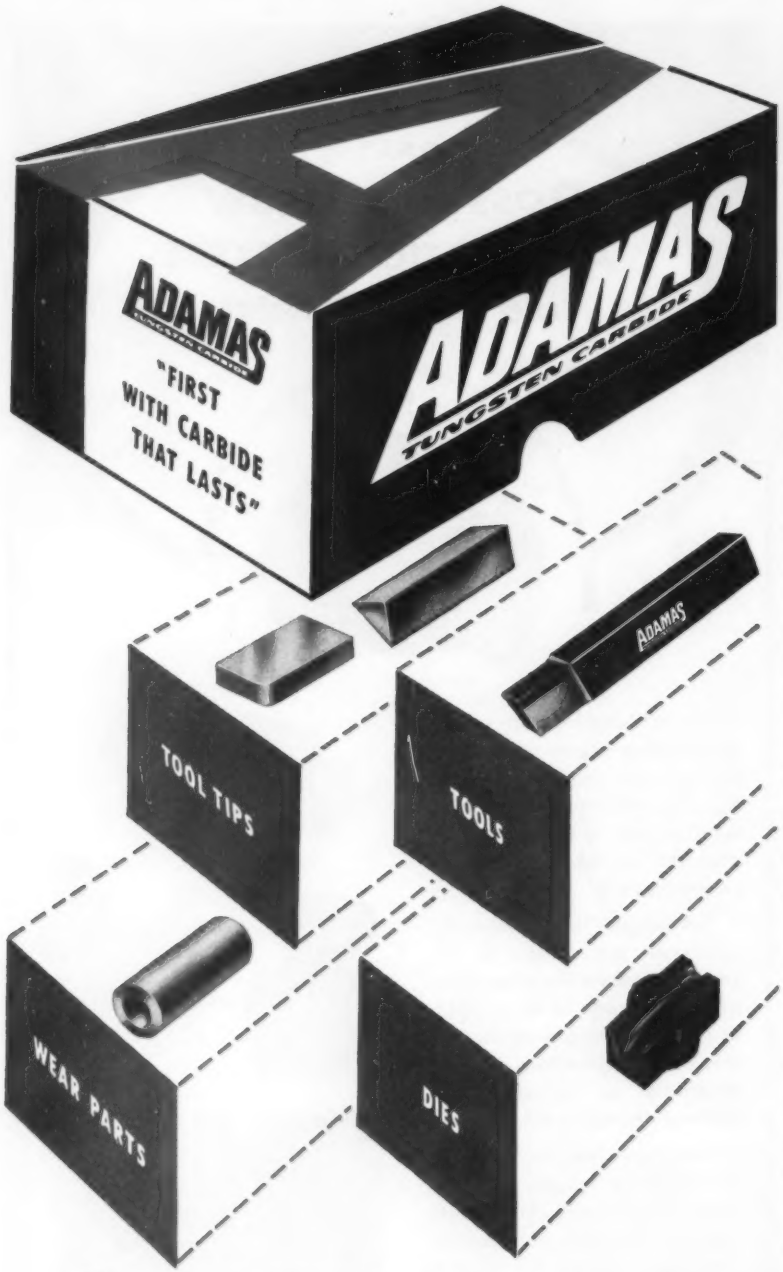
The examples of work shown here are typical of the wider variety of parts being produced on these new machines.

SEND FOR detailed information on this new machine. Let us have samples of your work in order to give you time and cost estimates for handling it on the "1-2-3" Goss & De Leeuw.

GOSS & DeLEEUW

GOSS *and* DE LEEUW

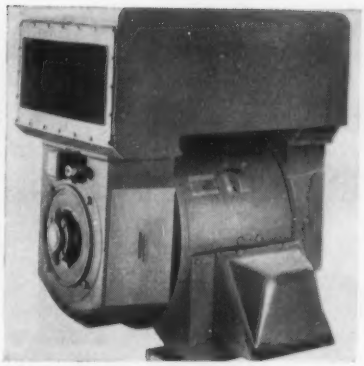
MACHINE COMPANY, KENSINGTON, CONN., U.S.A.



You'll find your tungsten carbide needs, whatever they are, best served under the big "A". It's the quickly-identified sign of the finest in carbide performance and service . . . adopted as standard today by leading metal working plants. It will pay you to know ADAMAS better, too . . . place your next order with ADAMAS and be convinced.

ADAMAS
TUNGSTEN CARBIDE

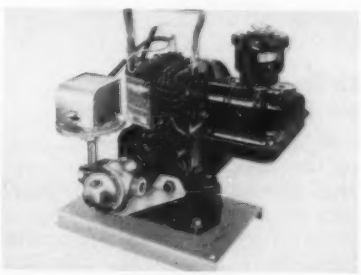
ADAMAS CARBIDE CORPORATION · KENILWORTH, NEW JERSEY



GE Totally Enclosed Unit-Cooled DC Motor

DC motor for use in severe atmosphere is available for ratings from 15 to 200 hp and reportedly features 50% greater heat transfer in a 37% smaller unit than previous designs. Ventilation is independent of motor speed; double system of blowers insures rapid cooling. One blower assembly forces cooling air from room through external passages, while other forces internal motor air through closed internal passages of air cooler. Blower motors are for 3-phase, 60-cycle power supply. Blower controller consists of magnetic switch which can be interlocked with main controller. Thermostatic relay protects main motor in case of blower-motor failure.

General Electric, Schenectady 5, NY



Oil or Water Transfer by Gasoline Engine Pump

Hypro Engineering hollow-shaft pump, model G 3800 VS, mounts directly on drive shaft of model 5S 1-hp Briggs & Stratton gasoline engine and runs for 1¾ hrs on tank of fuel. Capacity of pump is 8 gpm; pressure range to 30 lb. Unit shown is equipped with special vacuum switch to guard against burned out impellers when liquid supply runs dry. Unit is complete with engine fuel tank, hinged carrying handle and baseplate.

Hypro Engineering, Inc, Dept KP 404 No Washington Ave, Minneapolis 1, Minn

HOW MAJOR INDUSTRIES NOW CUT *Product Costs*

1 AIRCRAFT TUBING—Smooth, extra sharp bends now produced in ultra-thin stainless steel tubing, saves space and $14,000 per plane for aircraft manufacturer. Shown above, Pines Size 4 Unit forming wrinkle-free 8" c/l radius bend in 4" x .020" S. S. tubing.

2 HOLLOW TRACTOR BOOMS—Cold bending 12 ga. welded steel tapered tubes without distortion on Size 4 Pines unit eliminates expensive blanking and forming dies, saves tons of material for farm equipment manufacturer.

3 EXTRUDED WINDOW FRAMES — Part of production line setup in large aluminum fabricating plant, this small Pines Semi-Automatic saves space, accurately bends automobile window frame moldings.

with PINES PRODUCTION BENDERS

The examples shown here are a few of the countless number of production jobs that are now handled efficiently and more profitably on Pines Automatic Benders. They illustrate the versatility and the many cost-cutting advantages of cold forming round, square, rectangular, extruded, or hollow stock the "Pines-Way". Simplicity of tooling, uniform accuracy, and ease of operation are proven features of Pines machines which today help hundreds of plants cut product costs. At Pines you'll find an unmatched wealth of bending experience and creative tooling skill readily available to help you develop better methods and save time on production problems.

Write for *Free* data sheets

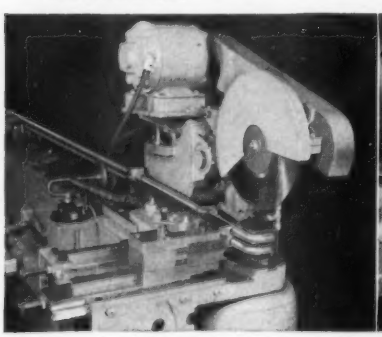
To keep abreast with latest developments in bending, write for copies of "Pines News" —bi-monthly mailing piece that gives facts on new, cost-cutting bending applications.

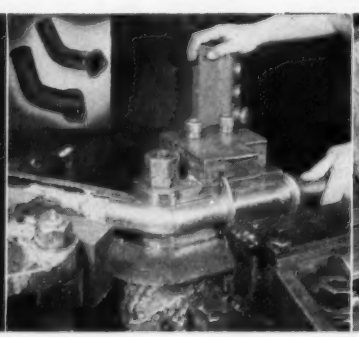
PINES ENGINEERING CO., INC.
Specialists in Tube Fabricating Machinery
672 WALNUT • AURORA, ILLINOIS

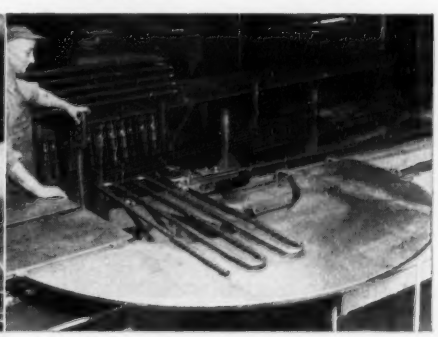
4 REFRIGERATION AIR CONDITIONING ELLS — Special Pines Automatic Cut-Off Benders now produce copper ells and return bends at speeds up to 1500 per hour, reduce scrap losses to 1%.

5 ENGINE MANIFOLD TUBES—Short 1½" O. D. steel tube now bent to 1½" c/l radius with flange attached saves space, insures accuracy, cuts costs.

6 BOILER TUBE AND REFRIGERATION COILS — Typical setup bending continuous serpentine coils from ¾" steel tubing. Reduces welding, fabricating costs. Other installations range from ¼" copper up to 3" steel tube.







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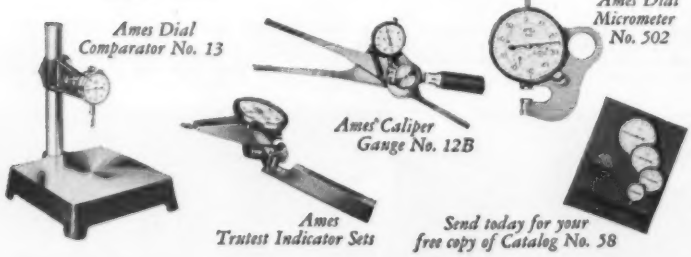
...the preferred

Ames Long Range Dial Indicator No. 262

... not because they cost more (in the long run they're more economical) but because they're completely *impersonal.* They do their measuring jobs absolutely independent of the human hand.

For more than 50 years, Ames Micrometer Dial Gauges and Indicators have kept pace with increasingly critical precision requirements. Today, each part of every Ames product is carefully built by exclusive Ames methods and machines from the materials best suited to its function — and 100% checked for accuracy. As a result, all Ames products are extremely accurate and sensitive, yet rugged and tough — to give you *longer* service with *less* down-time.



Ames Dial Comparator No. 13

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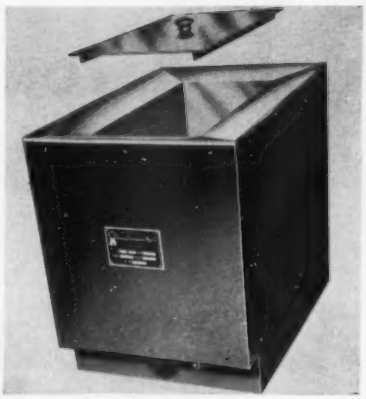


Uniformly-Heated Plastic-Melting Tank

Evens-Thompson Model 35 plastic-melting tank said to give fast uniform heating for top plastic dipping performance. New feature is the all-cast-aluminum melting unit with inward pitch self-draining top to melt plastic faster. This top design eliminates messy overflow and caking of plastic.

Unit is equipped with Robertshaw precision controls, and chrome steel sheathed electric heating elements. The dipping capacity is 3.6 gal; the size, 15x18x19 in.; weight, 32 lb.

The manufacturer makes a complete line of non-circulatory and constant-level plastic melting tanks and all types of Plasto hermetic seal hot melt plastic coatings.

Evens-Thompson Mfg Co, 11360 Kaltz Ave, Box 181, Center Line, Mich

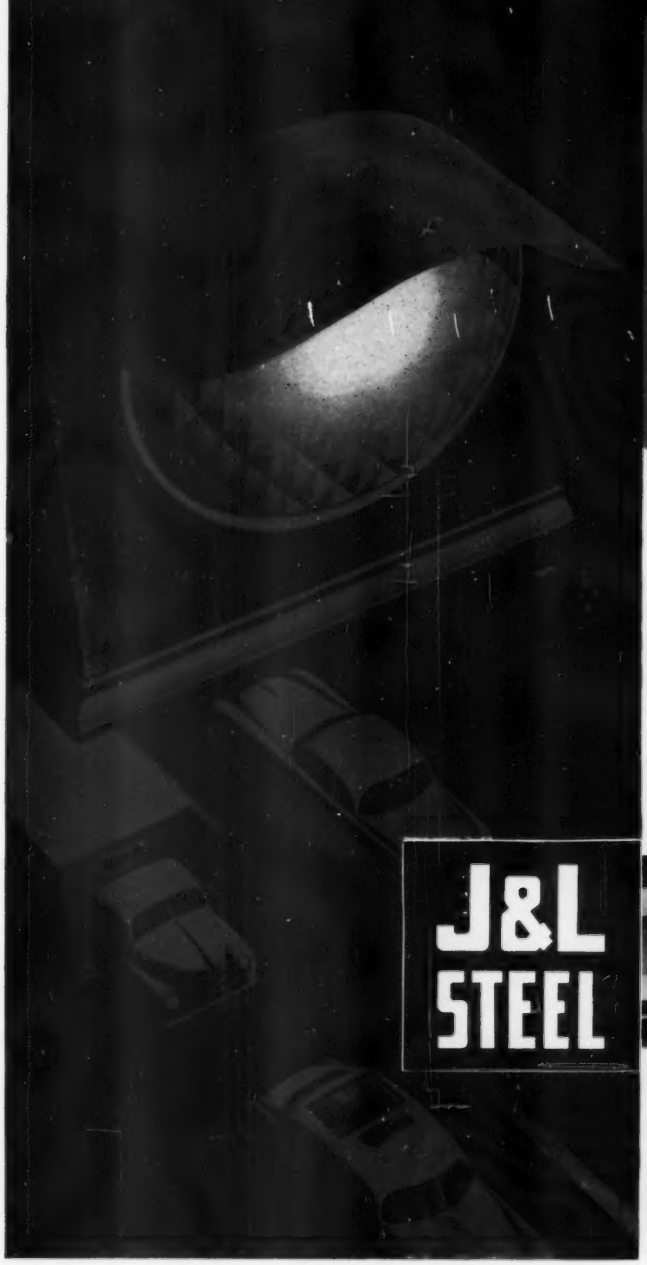
Dypral, a chemical safety coolant, is said to permit stepped-up speeds and feeds, as well as heavier cuts, prolong tool life, and eliminate degreasing. Pieces being machined remain cool, and product has a rust-inhibiting effect on finished parts. Coolant is a non-flammable water solution, containing no oil; ratio of water to Dypral is increased as speed of operation increases.

Dynamic Industrial Products Inc, Danbury, Conn

Quick-Change handpiece has been designed to eliminate need for any tools in changing the working attachments affixed to the end of flexible shaft equipment. Device is fitted with a spring lock retaining button. To change handpiece, operator presses the button, pulls entire piece and the permanently affixed tool away from the shaft and snaps a new piece and tool into place.

Franklin Balmar Corp, N A Strand Div, Woodberry, Baltimore 11, Md

start with JALCASE®



for better results use
the J&L cold finished steel
with a reputation for:

- easy, consistent machinability
- good heat-treating properties
- high cold-drawn physical properties
- wide range of applications

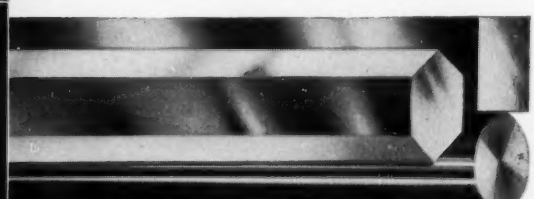
Jalcase was developed in J&L's metallurgical laboratories to meet the need for a free-cutting open-hearth steel with the mechanical properties required for high quality machined parts.

Today, specifications are standardized within the steel producing industry and S.A.E. and A.I.S.I. numbers have been assigned:

LOW CARBON GRADES		HIGH CARBON GRADES	
Jalcase Designation	A.I.S.I. Number	Jalcase Designation	A.I.S.I. Number
Jalcase—1	C-1113	Jalcase—7	C-1137
Jalcase—2	C-1114	Jalcase—8	C-1141
Jalcase—3	C-1116	Jalcase—9	C-1144
Jalcase—4	C-1117	Jalcase—10	C-1144 specially processed
Jalcase—5	C-1118		
Jalcase—6	C-1119		

And, J&L's Jalcase continues to maintain leadership in this group of steels.

J&L STEEL



When you specify "JALCASE," you can depend upon those qualities that help you obtain better production . . . longer tool life . . . lower overall costs. Remember to say "JALCASE" when you order.

Jones & Laughlin
STEEL CORPORATION — *Pittsburgh*

THE 20th CENTURY FORGE SHOP at Bingham-Herbrand, Fremont, Ohio

The efficient and highly productive Aviation Division of the Bingham-Herbrand Corp., Fremont, Ohio, relies entirely upon National for its heavy forging equipment.

At full operating capacity, these Maxipresses and Reducerolls are capable of producing exceptionally large quantities of precision forgings every day! This primary forging equipment includes:

4 2500-ton Maxipresses
6 2000-ton Maxipresses
6 1300-ton Maxipresses
2 700-ton Extrusion Maxipresses
5 No. 6 Reducerolls
1 No. 4 Reduceroll

Among the reasons underlying Bingham-Herbrand's exclusive preference for Maxipresses and Reducerolls are:

1. **Newest design to have been exhaustively proved in actual forge shop conditions.**
2. **Availability of National's continuing engineering assistance on die problems.**

If you have a forging problem — large or small, hot or cold, ferrous or non-ferrous — let us help you solve it. Send us prints, or a sample part, or, better yet, visit us. No obligation.

NATIONAL
MACHINERY COMPANY
TIFFIN, OHIO — SINCE 1874

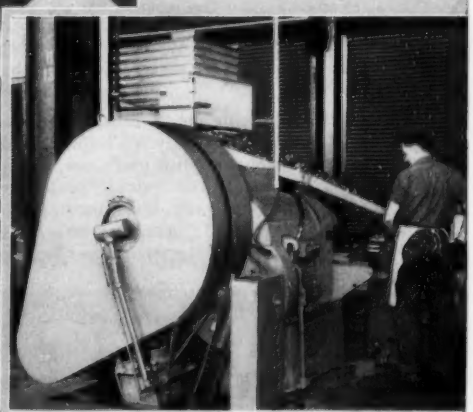
DESIGNERS AND BUILDERS OF MODERN FORGING MACHINES • MAXIPRESSES • REDUCEROLLS • COLD HEADERS • BOLTMAKERS • NUT FORMERS • TAPPERS • NAILMAKERS

Hartford Detroit Chicago

Relies Entirely on NATIONAL for Modern Precision Forgings!

This 2500-ton Maxipres (one of 18) now in production in the modern forge shop of the Bingham-Herbrand Corp.

Six Reducerolls at Bingham-Herbrand quickly preform jet aircraft engine blade and bucket blanks for finish forging in Maxipresses.



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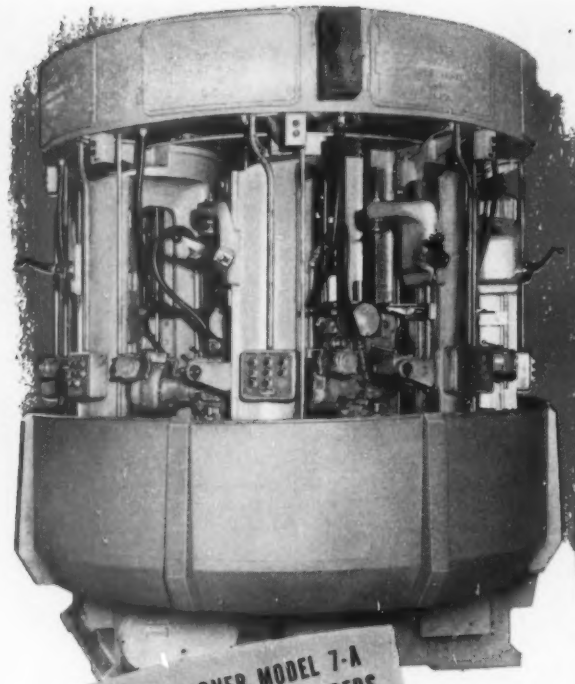

LEES-BRADNER MODEL 7-A
8-SPINDLE ROTARY HOBBERS

- Push-button production controls
- Electric hob shifter
- Electronic counter for longer hob life
- Patented automatic hob in-out mechanism

Engineered for Today with Reserve Capacity for the *Future*

Things are moving fast these days. The car that was so spanking new and modern yesterday is "old hat" when the new models come out.

The same could be said for machine tools. That's why it's important to *look ahead* when buying machines. To ask *more* than "What can it do today?" Tomorrow comes fast and it's important that the tools you buy now have the reserve capacity for your future needs.

Lees-Bradner hobbing machines are *engineered* for extra capacity. They're built to run longer and at greater speeds than other machines of their type. And because they are semi-automatic the labor savings are considerable.

That's why we can say that when you buy a Lees-Bradner hobber you're buying not only for today but for tomorrow, too.

Your Lees-Bradner representative will be glad to give you the facts. Or write us direct.

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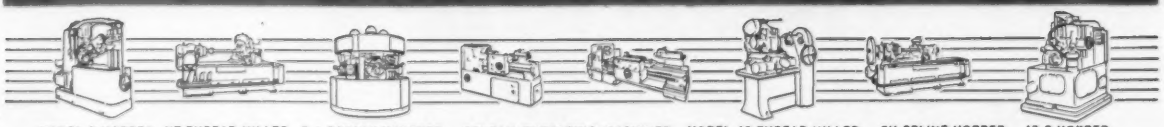

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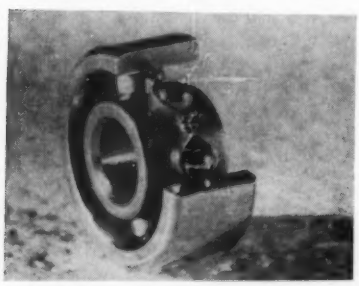
Modernair Low Pressure Hydraulic Pumping Unit

Low pressure hydraulic pumping unit was specifically designed for use with Modernair components and systems. Unit is said to be suited to many individual installation requirements. Price is $159.50 complete with motor, 5-gal reservoir, breather, dipstick, overload protection and capacitor, relief valve set for 200 psi, and needle bearings for continuous service.

Modernair Corp, 400 Preda St, San Leandro, Calif



Redesigned Micro Bearing Features New Retainer

New Hampshire Ball Bearings has redesigned the R2 bearing, designating it Micro R2, to feature a ribbon-type, balanced, cone-controlled retainer which reportedly cannot wind up, hang up or fall out. The result is said to be a low and repetitive starting torque in one bearing and from one bearing to another.

The new retainer is stronger and has higher speed limits than the old crown version; it has been tested at 90,000 rpm. It is available in the flange type with straight OD to provide simplified housing and easier mounting. Bearing is available in stainless B and in angular contact construction with phenolic retainer.

New Hampshire Ball Bearings, Inc, Peterboro, NH

GROUND FLAT TOOL STEEL

Microloy, Capewell's new non-deforming, oil-hardening tool and die steel, combines a tough cutting edge with extremely close retention to size after hardening and tempering. Ideal for tools and dies where construction does not permit grinding to shape after heat treatment. Use it for blanking, forming, and trimming dies, gauges, drill jigs, templets, punches, stamps, and special machine parts.

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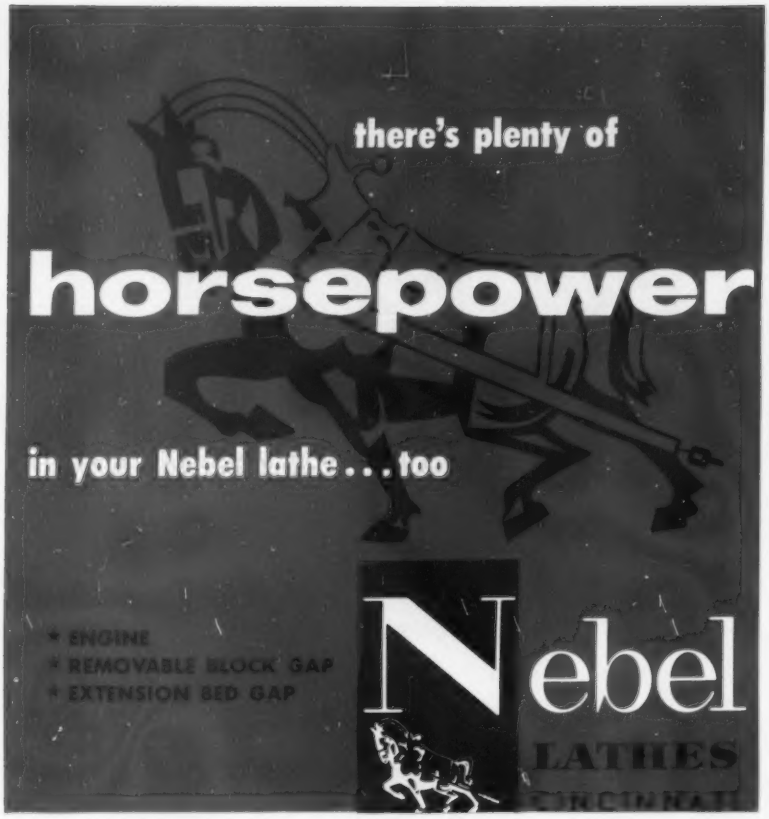

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Farco Branc Z is a powdered metal containing flux, developed for restoring galvanized coating and repairing areas damaged by welding. It has withstood 800 hours in a 20% salt spray without rusting. Product removes scale from black iron, penetrates rust and grease, and deposits a zinc alloy coating protecting the base metal from corrosion. Can be used to coat any metal including copper, stainless, monel, inconel, nickel, chromium, and Evanohm. Can be applied with torch or soldering iron, depending on thickness of the metal. Price, $3 per 2-lb can.

Farrelloy Co, 1217 N 26th St, Philadelphia 21, Pa

HZM 100, an aircraft structural aluminum alloy, has typical ultimate mechanical properties of 100,000 psi, and maximum resistance to corrosion. According to the manufacturer, the alloy will effect a saving in weight because extrusions of lesser cross-sectional dimensions can be used in design.

Harvey Aluminum, Torrance, Calif.

Nicro-Brazing process has been developed especially for use with stainless steel and other high nickel alloys. Nicro-Braz alloy itself, when brazed in a dry hydrogen atmosphere with the parent metal, stainless, for example, forms an entirely new alloy having a R_c of 30 to 35, plus a much higher melting point than the original Nicro-Braz. Ductility, shear strength, tensile strength, and corrosion resistance of the new alloy are similar to that of the stainless. Tensile strength of a Nicro-Braz joint with stainless is 90% at room temperature, 106% at 1600 F, and 99.8% at 2000F.

Twigg Industries, Inc, Brazil, Ind

Line of Fluid-Shaft motors in frame sizes as low as No. 203 incorporates a newly-designed "midget" fluid coupling for use on ratings from ½ hp through 1 hp. Greatly reduced size is effected by the development.

Reuland Electric Co, Alhambra, Calif

Screw-on wire connector with one-piece molded plastic threads and body has been designed for low-cost connections of Nos. 14, 16, and 18 wires, is available in two sizes, A-1 and A-3. Plastic is moisture-proof and resistant to most chemicals. Units withstand temps to 400 F.

Ideal Industries, Inc, 1057 Park Ave, Sycamore, Ill

Viscol Clarol leather belting preservative contains no oil, grease, or resin. Insoluble in water, it is designed to repel water and steam, and will not dissipate. Can be applied by brush, spray, or oil can.

The Viscol Co, 18 East Ave, Bridgeport, Conn

Low-cost Hild floor machine, Model K, is now equipped with an automatic safety switch. Momentary contact design turns on current when switch lever is pressed against handle grip, and instantly shuts off current when operator releases grip, eliminating risk of damage to property or machine.

Hild Floor Machine Co, 740 W Washington Blvd, Chicago 6, Ill

Non-slip, non-skid floor paint, called Sure-Grip, is a specially formulated plastic liquid containing a considerable amount of grit of near diamond hardness. Product is much thicker than conventional floor paint; rough surface prevents falls even when wet. Single coat application requires no primer; can be brushed over wood, metal, or concrete floors; covers from 75 to 100 sq ft per gal.

Colonial Refining & Chemical Co, NBC Bldg, Cleveland 14, Ohio

Series of Dings sheet floaters are available in three basic magnetic strengths and four standard heights capable of handling 28 through 10 gage blanks up to 30 x 20 in. Units can be used singly or in pairs to handle sheets of almost any shape and stack of irregularly shaped sheets.

Dings Magnetic Separator Co, 4740 W Electric Ave, Milwaukee 46, Wis

Alloy brazing rings are available packaged on cardboard tubes or on dowel rods for speedier use in production; elimination of damage or loss; constant, accurate inventory.

Alloy Ring Service, 1095 E 52nd St, Indianapolis 5, Ind

A 10,000-lb capacity electric-powered, hydraulically operated fork truck has been introduced with front wheel drive, rear wheel steer, designed for tiering with telescoping lift, and tilting. Unit is equipped with 42-in. forks, turns in intersecting aisles of 83 in. Hoist speed, full load—up: 15 fpm, down: 35 fpm.

Elwell-Parker Electric Co, 4205 St Clair Ave, Cleveland 3, Ohio

in vertical and horizontal grinders

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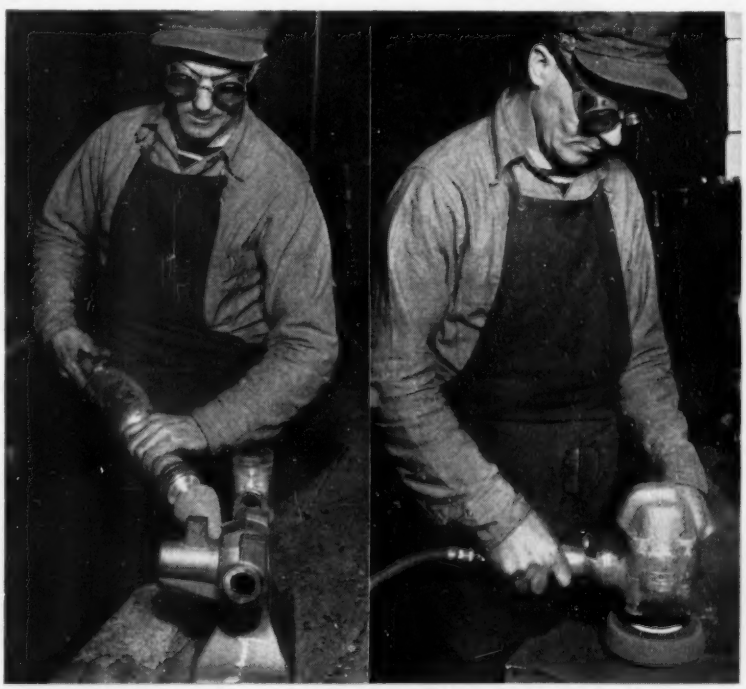
When you're completely satisfied with the quality of your products, and quite happy with your low production costs, just sit back—and watch your competition move out ahead!

Or, better still, start looking for methods to improve product quality and reduce production costs. Like an Ohio foundry, where a test *proved* that a lighter, faster Buckeye portable grinder could do an even better job, in less time, at lower cost. And, as a "bonus," this grinder has been operating for more than two full years without any repair service required.

In every industry, it's time to improve your competitive position. If this involves portable air tools, it's time to test Buckeye Tools in your plant, on your work, to *prove* them to your own satisfaction. May we send you a copy of our Air Tools Catalog?

Getting into the corners is easy with this lightweight, maneuverable Buckeye horizontal grinder. Faster speed means less wear on cone wheels, too.

On jobs where large, relatively flat surfaces are worked, Buckeye vertical grinders help increase productive output, improve product quality.



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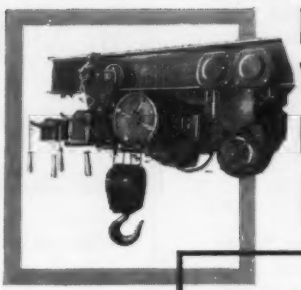

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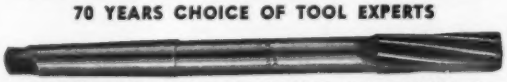

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How the Fable of

"The Birds, The Beasts & The Bat"

has a parallel in Cutting Fluids

. . . thanks to Aesop for this Fable

The Birds were engaged in a fierce battle with the Beasts. The Bat figured he could pass as either a Bird or a Beast and he wanted to be on the winning side. As the battle see-sawed he flitted back and forth. The Birds finally won but the Bat got back to their side too late and was chased away to a cave, where he has lived ever since, ashamed to come out except at night.

The Parallel . . .

Like the Bat in the fable, some cutting fluids appear to be both Bird and Beast, but may be neither. If you are going to tap a tough, difficult to machine metal you need a heavy duty cutting oil with high *anti-weld* and good *lubricity* characteristics. On a less exacting light milling job a conventional water-mix fluid with good temperature regulating properties is usually the answer.

The point the fable emphasizes is that a cutting fluid can't be on both sides of the fence. You don't need a different fluid for every job but you need one that's *right* for the job. Stuart products and Stuart experience will give you the best possible results in terms of finish, tool life and production. Ask to have this demonstrated to you by a Stuart Representative.

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Swanson Series TC Unit shown with optional mounting brackets.

By providing a "packaged" intermittent-motion chassis, Swanson Turret Indexing Units save time and money in designing and building special automatic machines for precision production operations on small and medium parts.

SWANSON series TC indexing turrets differ basically from the accepted series T units only in the solenoid-operated clutch drive provided. They incorporate the same Swanson cross-over cam and locking device to assure harmonious indexing and accurate, positive positioning at all work stations. They are available in a wide range of turret diameters and work stations, with full provision for mounting operational devices of all types.

The new clutch-operated models have been developed to handle applications requiring a high variable of infinite work cycles . . . or where it is desirable to have the operator control the indexing cycles by push-button controls. Limit switches may also be provided to prevent indexing before completion of any operation cycle. Without obligation, Swanson engineers will be glad to suggest applications of these units and accessories to you. In over a third of a century, Swanson-made machines have improved quality and quantity in hundreds of manufacturing operations.

Write for Bulletin TC1

. . . See these PRECISION PRODUCTS by SWANSON

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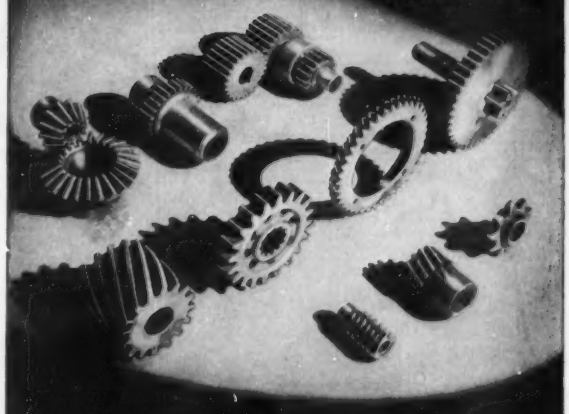

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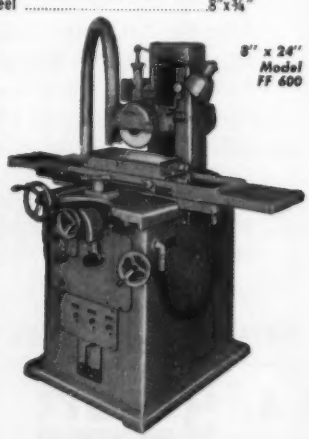
	Grinding wheel	8"x¾"

Where highest precision is required the ABA precision Surface Grinder meets every test. With the aid of divided heads, sine plates, and other attachments it can handle the heaviest and most difficult jobs. Complete hydraulic table feed as well as manual operation make this grinder doubly practical. The use of ball bearings means extremely easy handling of all hand wheels and operating levers.



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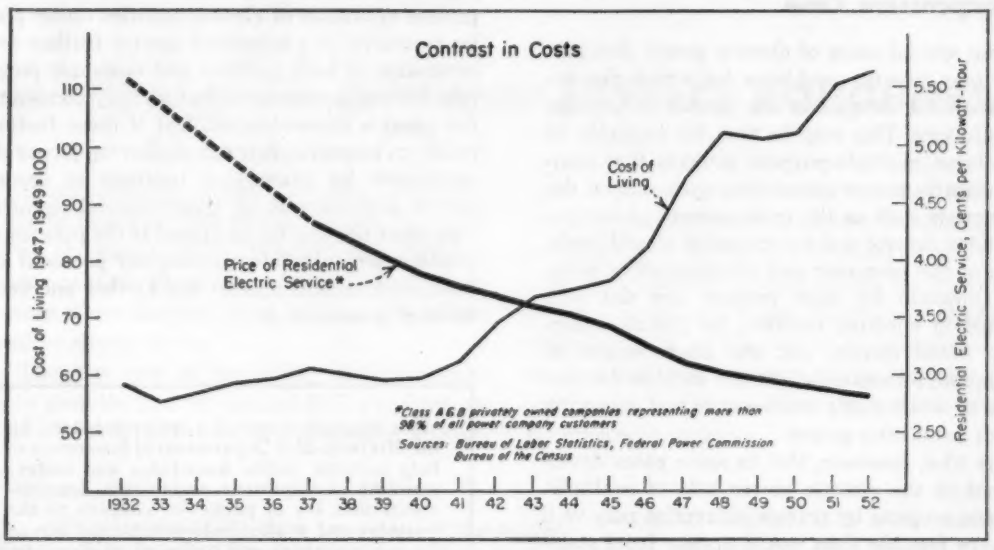
A 20-YEAR RECORD...

The Electric Power Companies' Case for Public Confidence

An economic study of the record of the investor-owned electric power companies of the United States over the past twenty years underwrites their claim to public confidence today. A key factor of this record is set forth by the chart in the middle of this page. This shows that while the cost of living as a whole has almost doubled, the average price of electric energy for residential use in the United States has been cut in half.



The average prices of industrial and commercial power also are much lower than they were twenty years ago.

Such a study confirms the record on other key accomplishments of the electric power companies during the past two decades.

They have not failed, either in peace or war, to meet the nation's rapidly expanding electric power requirements. In paying tribute to the performance of these companies during World War II, J. A. Krug, Director of the Office of War Utilities, said, "Power has never been too little or too late." The same can be said for the entire period of the past twenty years.

To be ready with enough power — on time — the electric power companies have expanded their production fourfold since 1933. This has required an investment of over $17 billion in new facilities. To raise the funds for this investment they have enlisted the participation of about 3 million direct stockholders. Through life insurance companies, banks and similar institutions, about 90 million Americans — more than half of the nation's total population — have become investors in electric power companies. By thus relying on private investment for their expansion, the power companies have provided their

plant and operating equipment without burden on the taxpayer.

In addition, the investor-owned companies have paid about $12 billion in taxes to various governments — national, state and local — over the past twenty years. Unlike government-owned and -operated systems, they have received no public subsidies. When taxes and subsidies are taken into account, the rates for electricity charged by the investor-owned companies have been as low as, or lower than, those charged by government-owned and -operated systems.

Many Americans do not appreciate the job that the power companies have done over the past two decades. That is due, in part, to the public memory of financial abuses by some utility holding companies during the 1920's. This memory obscures a clear and unprejudiced view of the progress since those days. And some of the all-out advocates of reliance on government rather than on regulated private enterprise for the development of our power resources do their best to keep this memory of the past alive in the present.

An Impressive Case

Some special cases of electric power development may involve problems for which the investor-owned companies are unable to provide full solutions. This may be true, for example, of some large multiple-purpose projects that combine electric power generation with related developments such as the improvement of navigation, flood control and the irrigation of arid lands. Some of the economic and administrative problems imposed by such projects are not well adapted to effective handling by private enterprise. Flood control and the improvement of navigation, for example, usually involve the provision of much costly service over and above the cost of producing power.

It is true, however, that in some cases development of the electric power side of multiple-purpose projects by private enterprise may well be more feasible than would appear from statements by some government power advocates. And the record indicates that even in those projects on which both the power generation and the other services are handled by public authority, it may well be desirable to have the investor-owned companies assume the transmission and distribution functions.

Our study of the record of the investor-owned and -operated companies over the past twenty years has led us, of course, behind the statistics that bear on the wisdom of giving them a priority in the development of our power resources. It reveals that these enterprises are manned by people who, through lifetime experience, are peculiarly conversant with the needs of the communities they serve. They have given the consumer notably good service while conforming to standards set and enforced by public regulatory commissions. They have won the confidence of the investing public. By their nature and their experience they are competent to handle any power program that can be demonstrated to be economically sound.

The Paramount Public Interest

By their economic performance during the last twenty years, the electric power companies have earned the confidence of the public. By relying on these companies to meet its electric power requirements the public will fully protect its economic interest in ample and efficient service at fair prices.

That is where our study comes out. Our findings do not touch the political consideration that private operation of electric utilities under public regulation is a safeguard against further concentration of both political and economic power in a federal government that already commands too great a concentration. But if these findings make an economic case for preferring power development by tax-paying business as against power development by governmental agencies, they clear the way for an appeal to the paramount public interest in safeguarding our personal and political freedoms against the further encroachment of government.

This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nationwide developments that are of particular concern to the business and professional community served by our industrial and technical publications.

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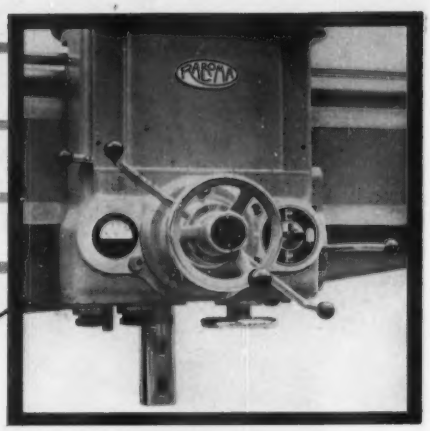

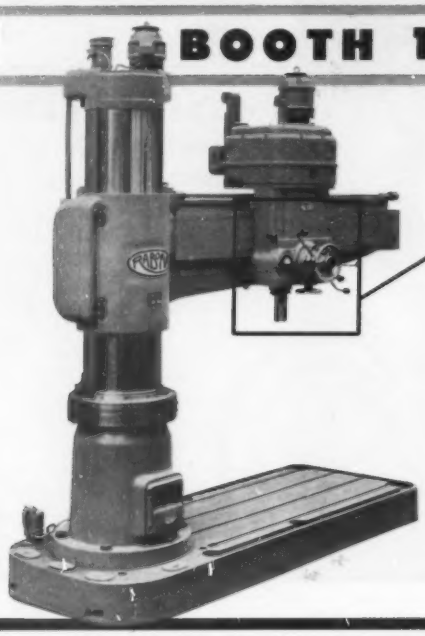

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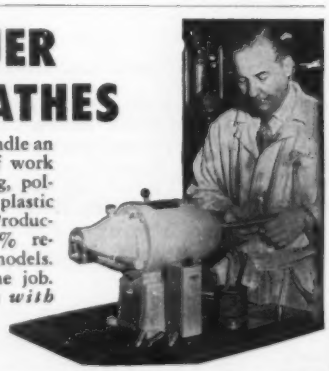

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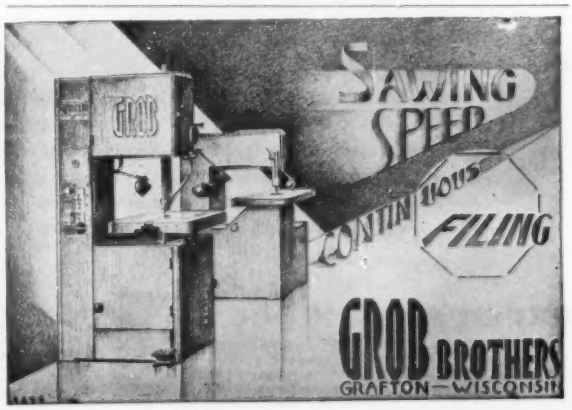

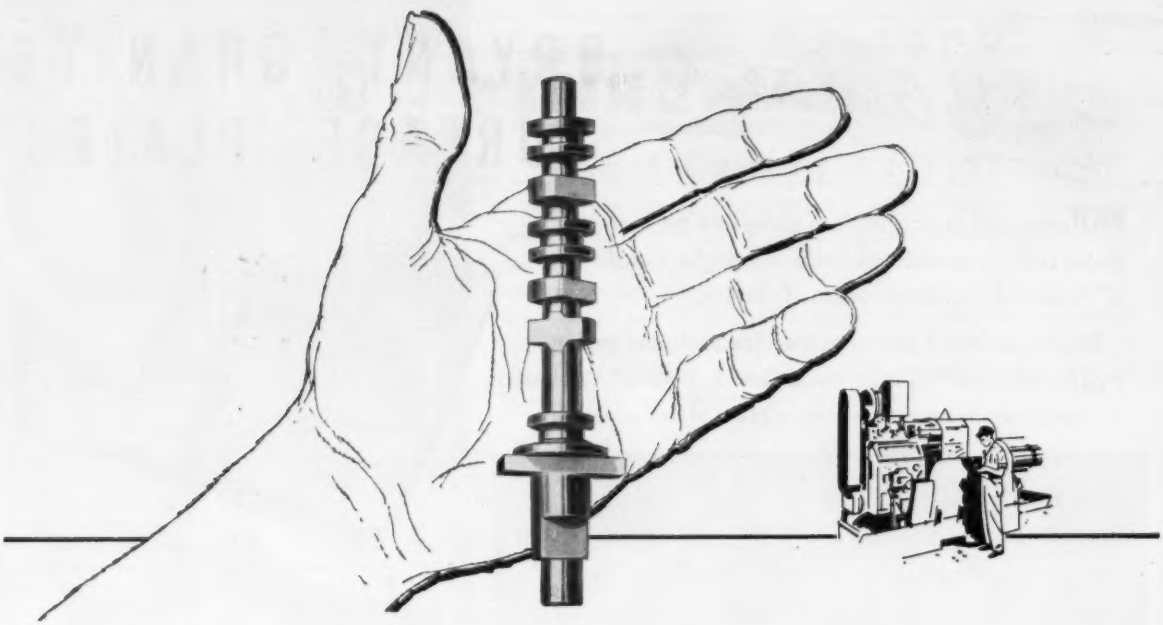

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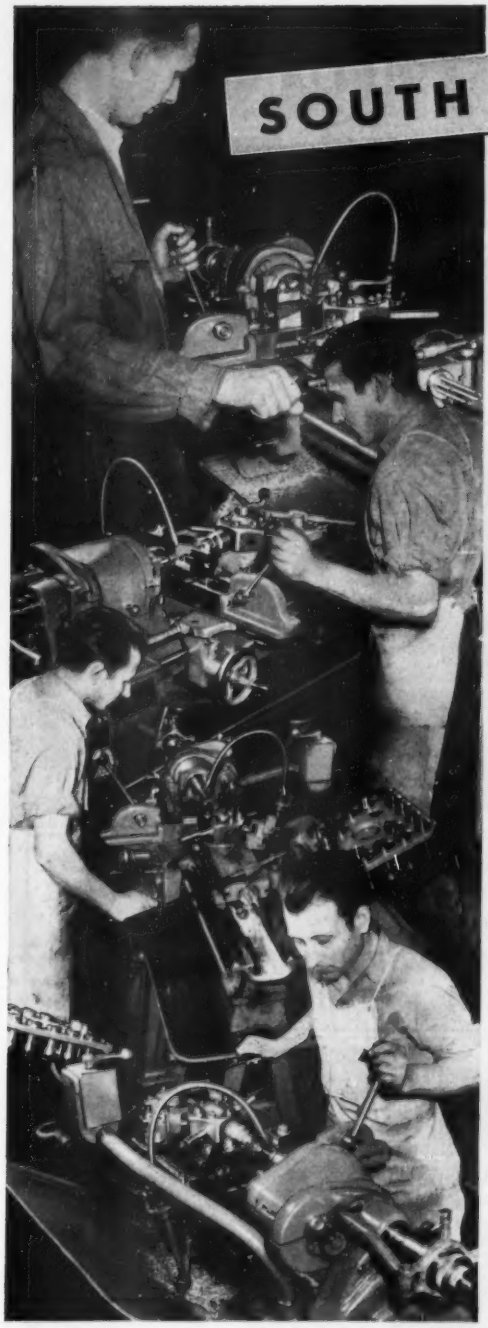

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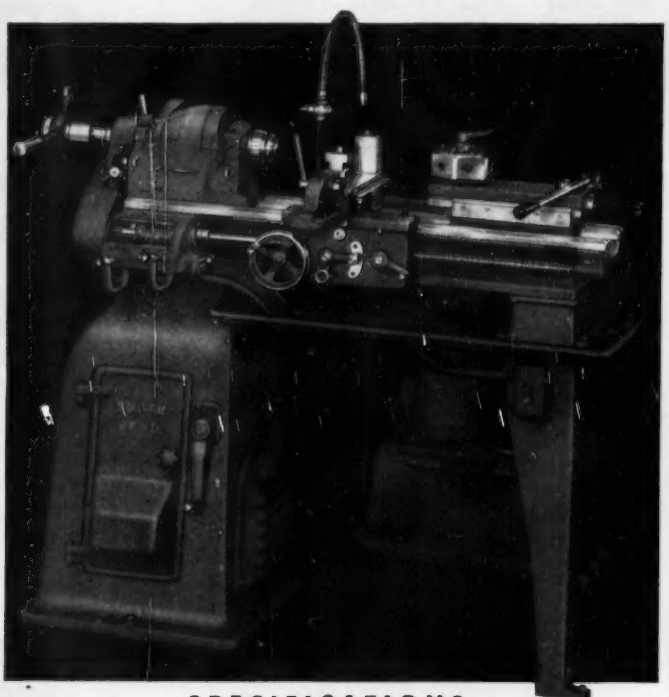

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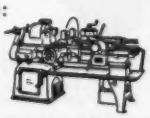

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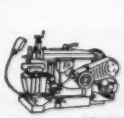

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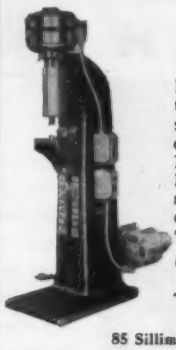

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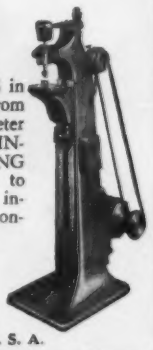

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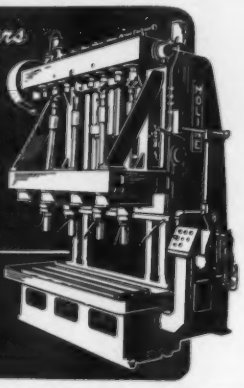

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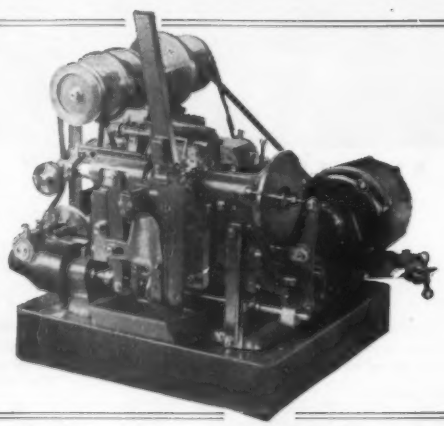

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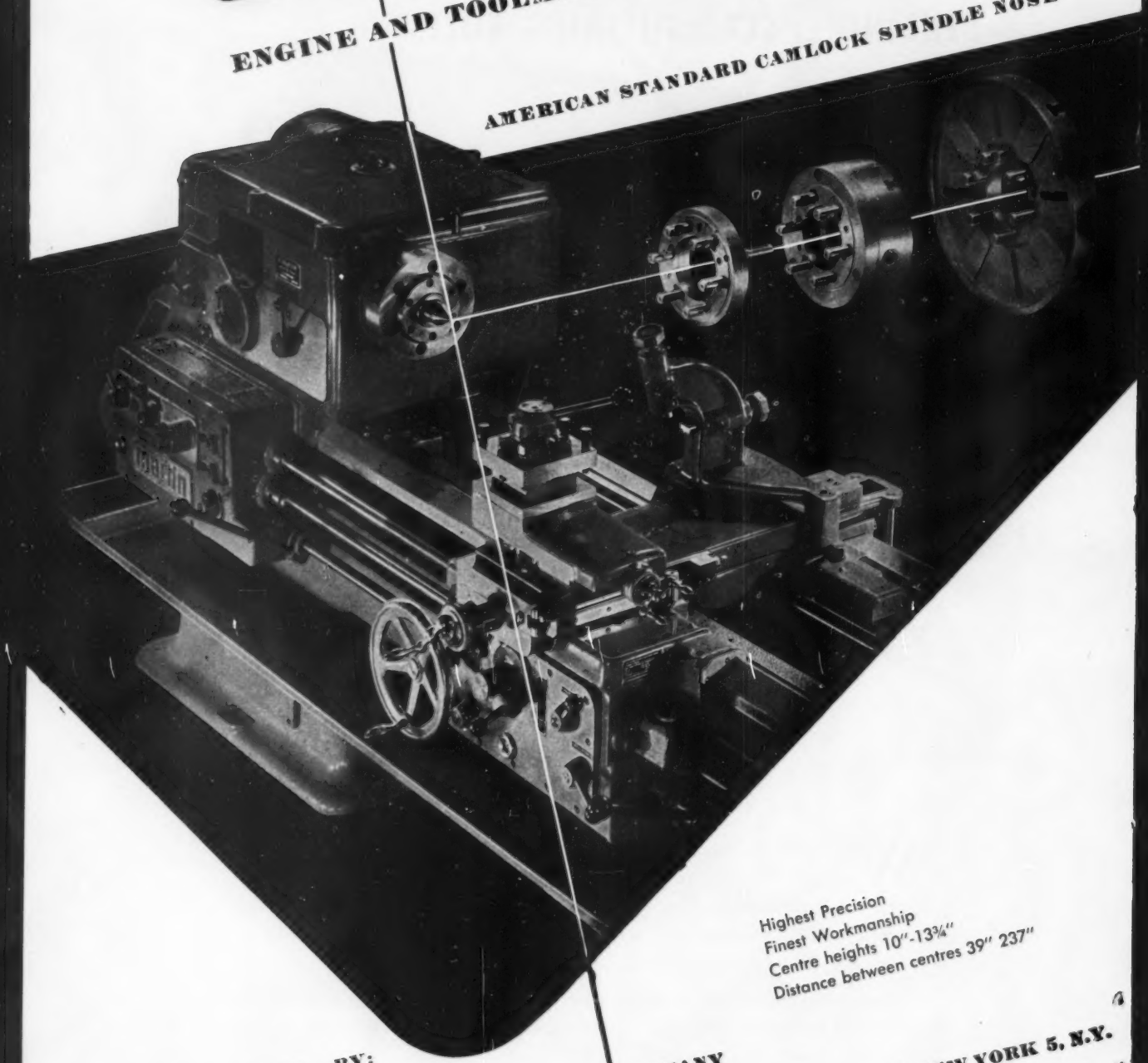

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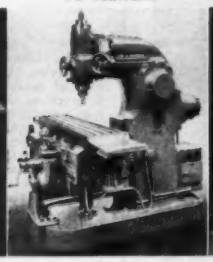

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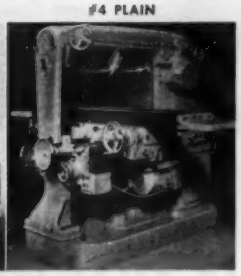

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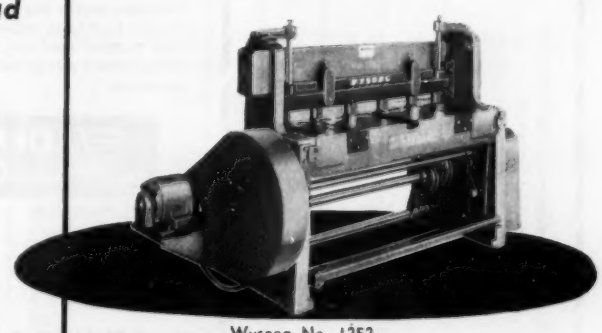

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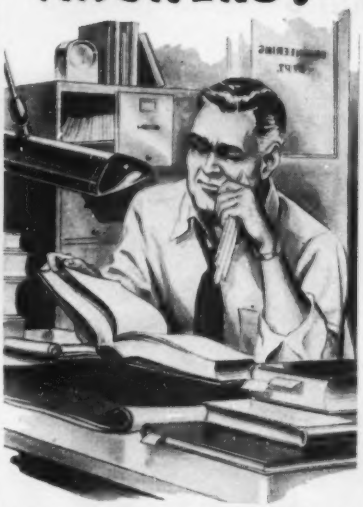

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10 to 12 ft. Lengths
ALL METALS
Also special screw machine products to order
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MACHINE SCREW
20-40 Barclay St.
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PATTERNS in WOOD and METAL
For All Kinds of Castings, Large or Small
MATCH PLATE WORK A SPECIALTY
Put your pattern problems up to us – we will take care of them.
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(Classified Advertising)
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Now Simplified Instructions
MACHINE TOOL RECONDITIONING
— illustrated —
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Propane Gas Installations
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Anhydrous Ammonia Plants
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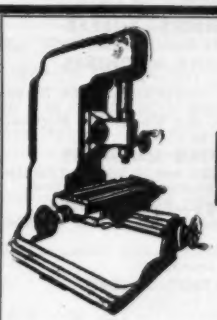

SEARCHLIGHT
Equipment Spotting
SERVICE

This service is aimed at helping you, the reader of AMERICAN MACHINIST, locate used and surplus new metalworking machinery and equipment not currently advertised. (This service is for user-buyers only.)

First, read the dealer ads on the following pages. A 5-minute study may locate the equipment now.

Second, send in the specifications of the equipment wanted on the coupon below, or on your own company letterhead, to

Searchlight Equipment Spotting Service
c/o American Machinist
330 W. 42nd St., N.Y. 36, N.Y.

Your requirements will be brought promptly to the attention of the used equipment dealers advertising in this issue. You will receive replies directly from them.

NO CHARGE • NO OBLIGATION

Searchlight Equipment Spotting Service
c/o American Machinist
330 W. 42nd St., New York 36, N. Y.

Please help us locate the following used equipment:

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NAME ..... TITLE .....

COMPANY .....

STREET .....

CITY ..... ZONE ..... STATE .....

3/29/54

1941-1954 MACHINE TOOLS

CUTTER & TOOL GRINDERS
FELLOWS: Flat Top Helical Gear Cutter Grinder
OLIVER: 10" Template Tool Bit

DRILLING MACHINES
ALLEN: No. 2 Drill—6 Spindle, 8" overhang
ALLEN: #2 High Speed 16"
BARNES: No. 210, 2-spindle, 21" Swing
PRATT & WHITNEY: ⅛B x 50 Deep Hole Drilling & Reaming Machine, 2-spindle
RADIAL DRILLS: Archdale, 5', 6' & 7', new

GEAR MACHINERY
FELLOWS: 61A & 64A Shaper, 18" dia.
FELLOWS: Flat Top Helical Gear Cutter Grinder
FELLOWS: Straight Line Generator, 8" dia. with many cutters
GLEASON: #12 Rough & Finish Gen.
GLEASON: 8" Straight Bevel Gear
SYKES: Rack Cutting Machine 12" to 36" length capacity (New)
PRATT & WHITNEY: Gear Grinder, 10" single and double wheel, hydraulic feed
GEAR GRIND MACH: GG-19, 10"x24" Hydr. Spur Gears and Splines
INTERNAL GEAR GRINDER, GG-31

GEAR TESTERS
FELLOWS: 8 LSI and 13 LSI Gear Lappers, external and internal spur and helical
FELLOWS: #12C Cone & Spacing Inspection Instrument
GLEASON: No. 3 Bevel Gear Tester
GLEASON No. 4 and No. 6 Bevel Gear Testers. Hand and Power
NATIONAL BROACH: SIC-12" Red Ring Gear Testing Machine

GRINDERS—CYLINDRICAL
BROWN & SHARPE: No. 10 cap. 6"x18" plain
CINCINNATI, 6"x18" Hydraulic, Plain
LANDIS: 16x32" Type "D" Crankpin, hydraulic, for grinding crankshafts
NORTON: 12"x36", Type C, Universal

GRINDERS CYL.—continued
NORTON: 10"x36", 30 Deg. Angle Wheel
NORTON: 10"x18" 45° angle wheel

GRINDERS—GEAR & SPLINE
GEAR GRIND MACH.: GG-19, 10"x24" Hydr. Spur Gears and Splines
PRATT & WHITNEY: 10" single and double wheel, hydraulic feed
INTERNAL GEAR GRINDER, GG-31

GRINDERS—INTERNAL
BRYANT: 16-16 Internal Hydraulic
HEALD: #50 Planetary

GRINDERS—RADIUS
VAN NORMAN: #73, capacity 7½"
VAN NORMAN: #649-16, cap. 6" to 16" dia.
VAN NORMAN: #3½ Un. Radius

GRINDERS—THREAD
EXCELLO: #31 External, dia. 5"x18"

HONING MACHINES
BARNES: Model 172, 7" stroke.
MICROMATIC: H-510 Double End Horizontal, ¾" to 2" dia.
MICROMATIC: H-2 Single End Horizontal, 2 spindle, ¼" to 1" dia.

LAPPING MACHINES
FELLOWS: 8 LSI and 13 LSI Gear Lappers, external and internal spur and helical

LATHES—PRODUCTION
BLOUNT: Polishing speed lathe 12" dia. x 48" centers
LODGE & SHIPLEY: #3A Duomatic, 25½" swing x 27" centers

LATHES—TURRET
BULLARD: 36" Vertical turret
WARNER & SWASEY: #1A, #2A, #3A & #4A
WARNER & SWASEY: #3, #4 & #5
HERBERT: #0, #2, #4, #7, #8 and #9B/30 Sizes, new
WEBSTER & BENNETT: Vertical Turret Lathes 36" & 48" (New)

MILLING MACHINES
SUNDSTRAND #1 RIGIDMIL
TAYLOR-FENN: M-80 Duplex Spline
RICE-BARTON: 4" Twin Spline
VAN NORMAN: 10CT Contour Miller, horizontal opposed spindle type for milling flat cams, also can be converted to similar work

SAWS & CUT-OFF MACHINES
RUSSELL: 9½" cut-off Saw with Auto. Stock Feed (New) Hydraulic
RUSSELL: 5½" dia. cut-off saws, auto stock feed, hydraulic (New)
MOTCH & MERRYWEATHER: No. 3 Circular Saw with auto. stock feed

THREAD MILLERS & TAPPERS
HALL PLANETARY: Model "D" Thread Miller
LANDIS: 2½" single head horiz. threading machine
LEES-BRADNER: #40A Thread Miller
LEES-BRADNER: CT-36 Thread Miller chucking type, 1 3/16" hole
MURCHEY: #22 Horizontal threading and tapping machine, ½" to ½" dia. capacity, single spindle

MISCELLANEOUS
MOLDING MACHINES, ROLLER JOLT: Osborne Model 2047-3
OPTICAL PROFILE GRINDER: Wickman New
OPTICAL PROFILE GRINDER, Sheffield, used
AUTOMATIC SCREW MACHINE, Swiss type, ⅜"—used
AUTOMATIC SCREW MACHINE, Wickman, Single Spindle, 7/16" New
RACK CUTTING MACHINE: Sykes 12" to 36" length capacity (New)
CUT-OFF: Russell 5½ & 9½" cut-off saws with auto. stock feed (new) hydraulic
TEST STAND: Denison 918-AM Hyd.
HARDNESS TESTER: Grogan Brinell, 16-8
SHEFFIELD Precisionaire Gauge
SUNDSTRAND: Double-End, #53, 42" & 60" Centering Mach.
WIRE FORMING MACHINES: 4-slides (new)

TRIPLEX MACHINE TOOL CORP. ESTABLISHED 1919

75A West Street, New York 6, New York — **Cable Address TRIMACTOOL**

HD MACHINE TOOLS

Serving the World's Largest Manufacturers

No. 47 Heald Single End Boromatic—Serial #4548
DB2112-A Excello Single End Boromatic—Serial #10160
#5 Late Type Gisholt Turret Lathe—Serial #848-36
#5 B & S Cylindrical Grinder, Late
#36 Van Norman Miller, Late
42" Bullard—Late
24" Bullard—Late
36"x25' ex Sidney Lathe
22"-44"x80" Bed Putnam Sliding Bed Gap Lathe

MONA MEMBER

NEW - USED REBUILT MACHINERY

HAZARD BROWNELL MACHINE TOOLS INC.

350 WATERMAN STREET — PROVIDENCE 6, R. I. — DEXTER 1-6880

"LOOK THESE OVER"

#45 HEALD Boromatic
10x20 MONARCH Model EE Toolmaker's Lathe
12x30" MONARCH Geared Head Lathes
14x40 CARDIFF Gap Bed Lathes
30"x16' bed AMERICAN High Duty Geared Head Lathe
30"x17' AMERICAN Heavy Duty Geared Head Lathe, 1941.
42"x15' AMERICAN Heavy Duty Lathe
42"x25' centers AMERICAN Heavy Duty Lathe
Nos. 5A and 5Y BRYANT Internal Grinders
10x36 HILL CLARKE Pl. Cyl. Grinder
No. 172 HEALD Gap Internal Grinding Machine for large swing
10"x72" LANDIS Type C Hydraulic Plain Grinder —1942
24"x276" LANDIS Type B Hyd. Pl. Grinder
Nos. 4D and 6S POTTER & JOHNSTON Automatic Lathes
1L GISHOLT Universal Turret Lathe, 1946
No. 8A JONES & LAMSON Saddle Type Universal Heavy Duty Turret Lathes
No. 2 CINCINNATI HS Dial Type Plain Millers
No. 0-8 CINCINNATI Plain Milling Machines
No. 2M CINCINNATI Vertical Miller, 1941
FITCHBURG Plain Horizontal Mfg. Type Milling Machine, 24"x72" table.
No. 1-18 CINCINNATI Plain Mfg. Miller
No. 3B BROWN & SHARPE Dual Control Plain Miller
No. 12 BROWN & SHARPE Plain Bed Type Production Miller
#5 CINCINNATI High Power Plain Miller with motorized overarm
6"x60" P&W Model C Thread Miller
Nos. 64 and 72 FELLOWS High Speed Gear Shapers
No. 12 FELLOWS Gear Shaver 1943
No. 36BM GOULD & EBERHARDT Gear Rougher
16/20" GOULD & EBERHARDT Industrial Shaper
36" OHIO "DREADNAUGHT" H.D. Shaper
100" BETTS Vertical Boring Mill, 2 heads.

WIGGLESWORTH INDUSTRIAL CORPORATION

203 Bent St., Cambridge 41, Mass.

MACHINERY FOR SALE

Brown and Sharpe Hobber, No. 44, serial No. 104 with Crocker Wheeler Motor, serial No. 748275. Equipped to cut spur and spiral gears and splines.

Schuchardt and Schutte Hobber, 36" CAP TP #2, serial No. 6706. Equipped with differential for cutting spur, spiral, and worm gears.

60" Reinecker Hobber, RF No. 4N, Serial No. 6937/1. Completely rebuilt. Equipped with Tangential feed and differential.

These hobbers now being used in production and in excellent condition. Can be seen in operation.

1—Monarch Lathe 12" and serial No. CK 3919.

1—Monarch Lathe 14", serial No. C-5239.

All of the above equipment motorized, 220 volts AC, 3 phase.

FS-8480, AMERICAN MACHINIST
330 W. 42 St., New York 36, N. Y.

MACHINERY FOR TRADE

Will trade 36" Schuchardt Hobber, Serial #6706 in excellent working condition. Maintains gear hobbing within .0006 tolerance and up to 36" diameter. Want 12" Pratt & Whitney Slotter in excellent condition.

Will trade Brown & Sharpe #44 Hobber, Serial #104 in good working condition. Can hob up to 12" in diameter, equipped for spur, helical and spline work. Want NATCO multiple Drill Press.

Will trade Landis External Grinder 10x48" Type DC, Scrial #30186 in excellent condition. Want a comparable condition Grinder 12 x 72".

Advise make, serial #, condition and full particulars of any machine you wish to exchange, including terms.

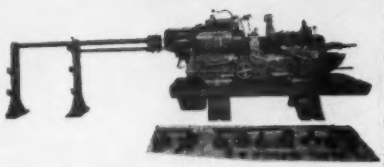
T-1867, AMERICAN MACHINIST
330 W. 42nd St., New York 36, N. Y.

BUY FROM STOCK
Telephone
BAKER 5887

FALK
MACHINERY COMPANY

10 WARD ST.
ROCHESTER 5
N. Y.

Every Item Guaranteed as Represented



No. 7 BARDONS & OLIVER Universal Turret Lathe. 2½" capacity. Preselector Head, Late Type.

No. 00G BROWN & SHARPE High Speed Automatic Screw Machine, Motor Driven, Late type.

No. 14 BERTSCH Initial Pinch Type Bending Rolls, 12' x ¾" capacity, Drop End, Motor Driven.

No. 1 LaPOINTE Motor Driven Horizontal Broach, 5 tons cap., 38" stroke.

50 HP. CHICAGO PNEUMATIC Air Compressor. Type NSB, 253 CFM, Piston Displacement.

4'x15" Column CINCINNATI-BICKFORD "Super-Service" Radial Drill, Motor on arm, Box table.

No. 262 BARNES Motor Driven Sliding Head Drill Press. 2" cap. in steel.

No. 2 M.T. Six Spindle ALLEN Type KH Drill Press, Individual Motor Drive, Late Type.

12"x36" LANDIS Type "C" Hydraulic Universal Grinder, with Ex-Cell-O Internal Grinding Attachment, M.D.

6"x18" LANDIS Type "C" M.D. Hydraulic Cylindrical Grinder, Serial #29196.

6"x18" NORTON Vertical and Horizontal Hydraulic Surface Grinder, complete with magnetic chucks, coolant systems, Late Model.

No. 208 BESLEY Motor Driven Disc Grinder, 26" wheels, Late Type.

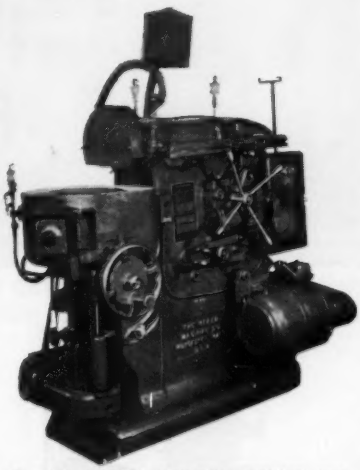
No. 8L FELLOWS M.D. Gear Lapping Machine. With Detachable Head, Universal Work Support.

No. 13LSI FELLOWS M.D. Gear Lapping Machine, with Detachable Head and Universal Work Support.

No. 194 BARNES Vertical Hone, 4" capacity, 12" stroke, Motor Driven.

30 K.W. LEPEL High Frequency Induction Heater.

16"x54" centers AMERICAN Pacemaker Lathe, Taper Attachment, Late Model.



No. 22 HEALD MOTOR DRIVEN ROTARY SURFACE GRINDER. 12" Magnetic Chuck. Late Model.

20"/27¾"x14' AXELSON Lathe, 115" centers, Taper Attachment, Late.

24"x12' BOYE & EMMES Timken Bearing, Geared Head, Lathe. Late Type.

27"x16' NILES, BEMENT, & POND Geared Head Lathe, 9' centers, M.D.

24", 36" BULLARD Vertical Turret Lathe, New Era, Turret Head, Side Head, Motor Driven.

No. 601 W.D. OSTER Motor Driven Turret Lathe, 1½" capacity, Late.

No. 2, No. 5 WARNER & SWASEY Geared Head Turret Lathes, Bar Feed, Motor Driven.

#3A WARNER & SWASEY Universal Turret Lathe, Timken Bearing, 4½" Capacity, M.D.

No. 0-8 CINCINNATI Rise & Fall Horiz. Mill, Late Model.

No. 3B KEARNEY & TRECKER Horiz. Mill, Double Overarm, Motor in base.

No. 2M CINCINNATI Universal Horizontal Mill, Full Equipment, M.D.

3" LUCAS Horizontal Boring Mill, V-belt motor driven.

42" Late Model KING VERTICAL BORING MILL

A.C. Motor Drive; 5 position turret head; Right Hand Side Head; 4 Jaw Chuck Table; Bijur System, Pendant control, New 1946. Excellent condition.

No. 5 FEDERAL Open Back Inclinable 4" stroke, Timken Bearing Flywheel, M.D.

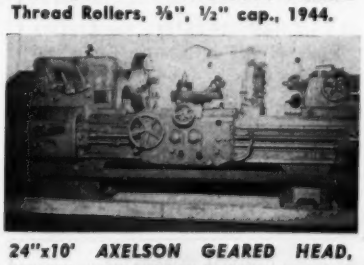
600 ton NILES-BEMENT-POND Motor Driven Wheel Press, 86" between strain rods, 14' capacity, 17" diameter ram.

#5, #7, #8 JOHNSON O.B.I. Presses. 56, 79, 90 tons cap. M.D. Flywheel & Geared Type.

10"x10" RACINE #30-C Hydraulic Heavy Duty Shear Cut Power Hack Saw, 1946.

10'x10 ga., 10'x¼" WYSONG & MILES Power Squaring Shears, Motor Driven.

No. 20, No. 30 WATERBURY FARREL Thread Rollers, ⅜", ½" cap., 1944.



24"x10' AXELSON GEARED HEAD, HEAVY DUTY MODEL "E" 28" ACTUAL SWING, M.D. TAPER ATTACHMENT.

OVER 1000 MACHINE TOOLS AVAILABLE IN STOCK • SEND US YOUR INQUIRIES

PANGBORN

ROTOBLAST ROOM

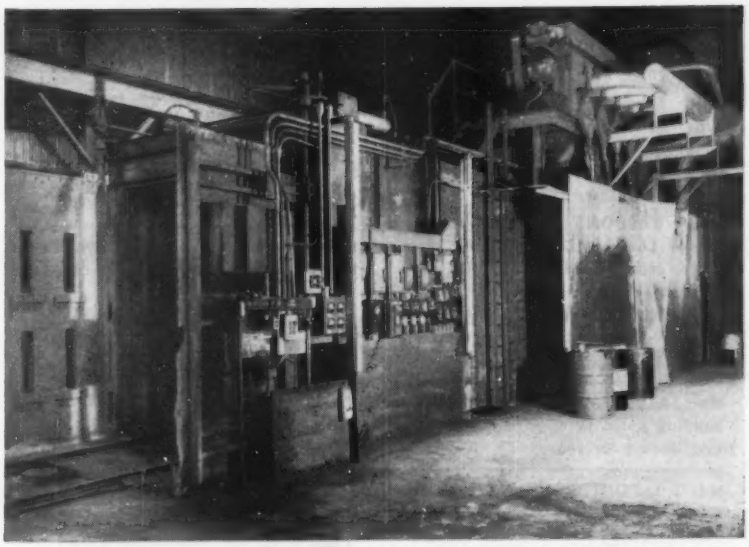
NEW IN 1951

51′ long 10′ wide 11′3″ high. Full size air operated doors at each end. Completely automatic operation. Four 20 HP Roto Blast Units. Complete electrical equipment, all motors and controls included. Built in sections, can be lengthened or shortened as desired. Complete abrasive handling and cleaning equipment with motors and controls. Complete dust collecting equipment 16,800 CFM capacity with motors, blowers, duct work and controls. Complete erection drawings available. Condition just like new. Write for detailed specifications and price to

CASTLE MACHINERY CO.
P. O. BOX 310
NEW CASTLE, PENNA.

FOUNDRIES
FABRICATORS

Here's a real bargain!!



NEW 1945
INGERSOLL SLAB OR STRADDLE
MILL 24″ x 24″ x 12′

Rise and fall, rapid traverse, complete tracing control, quick change speeds and feeds, tubular ways, anti-friction bearings, all electrical equipment, automatic cycling, coolant system.

MILES MACHINERY COMPANY
2039 Genesee Ave., Saginaw, Mich.

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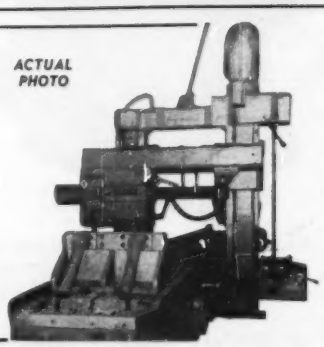

McDONALD

USED MACHINERY

Columbia 10′ Power Square Shear 3/16″ cap.
Baush 44″ Vert. Boring Mill 2 heads
Knight #40 Vert. Jig Borer
American 20″x8′ Grd. Hd. Lathe motor in base
Landis 20″x72″ and 18″x96″ Plain Ext. Grinders.
Hanchett 25 H.P. Sp. Vert. Hydr. Surf. Grinder 12″x48″ table.
W & S No. 2-A Grd. Hd. Univ. Turret Lathe chucking.
Jilvett No. 104 A.C. M.D. Internal Grinder.
Milwaukee Nos. 2-B & 3-B Horiz. Plain Millers D.O.
Cincinnati 36″x36″x10′ D.H. Planer 2 Hds. Box Table.
Heald No. 72A-3 Hydr. Int. Grinder Rod Head Sp.
LeBlond 27″x12′ Bed Grd. Hd. Q.C.G. Lathe 15″ hollow spindle.
Cincinnati No. 2 Hi-Power S.P.D. Vert. Miller.
G & L 3″ Bar Horiz. Boring Mill.
Barnes 20″ All Grd. Camel Back Drill 1-Sp.
Blanchard M.D. Vert. Sp. Surf Grinder 26″ chuck.
Campbell No. 213 abrasive cut off 1944.
Sundstrand 4-Sp. Vert. Rigidmill.
Heald #22 Rot. Surf. Grinder 12″ chuck 1942.
Landis 2-Sp. 2″ Cap. Bolt Threader M.D.
Hendey 16″x8′ bed Q.C.G. Lathe 1939.
W & S No. 4 Ram Type Grd. Hd. Turret Lathe.
G & E 24″ Gear Box Shaper Tilt. Table Top.
Newton 48″ Table 1-Sp. Cont. Vert. Miller.
Foster 2-F Fastermatic Hyd. Turret Lathe.
Kempsmith No. 2 Vertical Maximiller M.D.
Springfield Planer Type Surf. Grinder.
P & J #2 Auto. Prod. Miller, 2 Tables.
Foote-Burt #25 Box. Col. 1-Sp. Hvy. Drill.
L. & N. 9′, 10′ & 12′ Press Brakes.
Bullard 24″ & 30″ Vert. Turret Lathes.
Lynd-Farquhar 26″ stroke open-side Shaper Planer.

MONA MEMBER

McDONALD MACHINERY CO.
1531-35 No. B'way., St. Louis 6, Mo.

#2 NORTON UNIV. TOOL & CUTTER GRINDER, 1942, Hydraulic, Well Equipped.
Price $2,450.00

#2 CAM HASKINS TAPPER, Ser. #T21352, Equipped with air indexing fixture, 3/8″ Cap. in brass.
Price $650.00

Numerous Other Machine Tools

CURRIER MACHINE SALES
376 State St., P.O. Box 292
North Haven, Conn.

BENNETT MACHINERY CO.

GUARANTEED MACHINE TOOLS

AUTOMATICS, 1⅞″ 8 Spin. Consomatic
BORING MILLS, 42″ King, Side Hd., New 1942
42″ Bullard, Spiral Drive
72″ King, P.R.T., M.D.
100″ & 72″ N.B.P., 2 hds., M.D.
3½″ bar Defiance, Table (2)
8″ Bar Niles, Floor type
RADIAL DRILLS, 5′15″ col. Amer., Moter-on-Arm
4′13″ col. Cincl. Bickford, M.-on-arm
GRINDER, 16″x96″ Landis Hyd., Late
24″x168″ Cen. Norton "C", 1943.
LATHES, 48″x29′ & 24′ beds Niles (2)
20″x32″x168″ Cen. American Pacemaker
14″x80″ cen. Amer., T.A.
SHAPERS, 32, 28″, 20″, 16″ & 14″, G. & E.
SLOTTERS, 20″-24″ & 12″ Dill-Lobdells

375 Allwood Rd., Clifton, New Jersey
Phone: PAterson 9-8976 N. Y. Phone: LOngacre 3-1222

FOR SALE

1—Heald Sizematic, completely rebuilt by the Heald Machine Company within the last 6 months, serial No. 6887.

FS-8821, AMERICAN MACHINIST
330 W. 42nd St., New York 36, N. Y.

COPYING LATHE

Tracer Controlled Universal Toolroom 20″x60″. New 1952 in Perfect Condition—$9500.

FS-9913, AMERICAN MACHINIST
330 W. 42nd St., New York 36, N. Y.

MACHINERY FOR SALE
ATTENTION EXPORTERS

Unusual opportunity to procure modern Fellows Gear Shapers 615A and 645 as well as 12″ Gleason Generators, 30 BM Gould & Eberhardt Roughers, #7 Fellows Gear Shaper, #16 D. E. Whiton Machine. Write for full information.

FS-1865, AMERICAN MACHINIST
330 W. 42 St., New York 36, N. Y.

Eastern Rebuilt Machine Tools

THE SIGN OF QUALITY—THE MARK OF DEPENDABILITY

MAIN WAREHOUSE BAY IN EASTERN'S 11 ACRE CINCINNATI PLANT — THE LARGEST MACHINE TOOL PLANT IN THE U.S.A. DEVOTED EXCLUSIVELY TO REBUILT MACHINERY.

AUTOMATICS

⅞" Cleveland Model B, belt
1½" Cleveland Model A, belt
No. 6C Potter & Johnson, m.d.
14" Fay Flanders Type, m.d.
No. 8A Cleveland, m.d., 9" cap., latest Model B—1-1/16" Cleveland, m.d.
No. 5 DELX Potter & Johnson, m.d., late

BOLT THREADERS

Victor Nut Facing Machine, m.d., cap. ⅜" to 2" nuts
1" Landis Double Spindle, m.d. thru gear box
1½" Landis 2 spindle, late
1½" Landis 2 spindle, older type
2" Acme Double Head Bolt Threader, m.d.

HORIZONTAL BORING MILLS

Barrett Double End 5" and 7" spindles, m.d.
No. 42 Lucas, m.d.
5½" bar Betts Floor Type, m.d.
5½" bar Niles-Bement-Pond, m.d.
6" bar Newton No. 2 Cylinder Borer, m.d.
10" bar Sellers Floor Type, m.d.
54"x11' Rectangular Table, 40" high
Floor Plate 6'11" wide by 9'1" long x 9¼" thick, 8 T slots
Table 40" wide x 22' long x 7" thick, 4 rows T slots
Pair Floor Plates 52" wide x 18' long x 10⅝" thick
Natco Horizontal Production Boring Machine, m.d.

VERTICAL BORING MILLS

36" Bullard, m.d.
42" Bullard Spiral Drive, m.d.
42" Bullard New Era, m.d.
42" King, with side head and plain swivel head on rail
44" Putnam, m.d., p.r.t.
44" Niles, m.d., p.r.t.
46" Colburn, m.d.
48" Niles-Bement-Pond Car Wheel Borer, m.d.
53" Niles Heavy Pattern, m.d., p.r.t.
73" Niles, m.d., p.r.t.
100" Niles Heavy, m.d., p.r.t.
102" Niles Wheel Turning Boring Mill
12' Niles, m.d., p.r.t.
108" Cincinnati Vertical Hypro Vertical Boring Mill

BROACHING MACHINES

75 H.P. LaPointe Hydraulic Broach, m.d.
Cincinnati Mill Broach, m.d., 10" spindles, new
12x72" Thompson Automatic Flat Broach, m.d.

GEAR GRINDING MACHINES

6x20" Fitchburg Hydraulic Spline & Gear Grinder, m.d.
9" Pratt & Whitney Hydraulic Spur, m.d.
10" Pratt & Whitney Hydraulic Spur & Helical
No. 13LS Fellows Gear Lapper, m.d.
SG11 Gear Grinding Machine, m.d., latest
GG19 Gear Grinding Machine, m.d., latest
GG31 Gear Grinding Machine, Internal Gear & Spline Grinder, m.d.

GEAR HOBBING MACHINES

No. 120H Gould & Eberhardt Double Head Universal, latest
Type A Barber-Colman, m.d.
No. 5AC Lees-Bradner Heavy Type Gear Generator, m.d.
No. 12 Barber-Colman Double Overarm, m.d.
No. 12 Barber-Colman Single Overarm, m.d.
No. 34 Brown & Sharpe, m.d.
No. 44 Brown & Sharpe, m.d., Spur & Spiral
Pfauter Gear Hobber, Model RS 1, m.d. new
No. 3 Newark Gear Hobber Plain Type, m.d.

GEAR TESTERS

No. 1 Brown & Sharpe Spur Gear Tester
12" cap. National Broach & Machine Co.
18" National Broach & Machine Co.
18" Gleason Bevel Gear Tester, m.d.
No. 471 Michigan Tool Co. Hob, Reamer & Gear Checker

AUTOMOTIVE GRINDERS

Kwik-Way Model H Piston Turning & Grinding Machine, m.d., late
No. 76 Van Norman Automatic Piston Turning & Grinding Machine, m.d., late

CENTERLESS GRINDERS

No. 2 Cincinnati, m.d.
Cincinnati Valve Seat Grinder, cap. ⅜" valve stems, m.d.

DISC GRINDERS

No. 2 Gardner, belted m.d.
No. 151 Besly, m.d.
Hammond Disc Grinder, Model No. 600
Model V10 Hammond Belt Sander, m.d.
No. 4 Gardner Disc Grinder, m.d.
7½ H.P. U.S. Elec. Tool Co. Disc Grinder, m.d., new
14A Gardner Grinder, m.d.

EMERY GRINDERS

3 H.P. Baldor Emery Grinder, Pedestal Type
#516 Mummert & Dixon Radial Emery Grinder, m.d., 5 H.P. motor
No. 44 Excello Double End Carbide Grinder, m.d.

IN ADDITION TO THE ABOVE, WE ALSO HAVE IN STOCK DRILLS, HONING MACHINES, ENGINE LATHES, MFG. LATHES, MILLING MACHINES, PIPE MACHINES, PUNCHES & SHEARS, PLANERS, SAWS, RAILROAD MACHINERY, SHAPERS, SLOTTERS, TAPPERS, TURRET LATHES, ETC.

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311 CFM 12"x8" Ingersoll Rand air or gas
327 CFM 12"x7½"x12" Ingersoll Rand Imperial type
1400 CFM 21"x13"x18" Worthington Laidlaw horizontal

DRILL PRESSES

24" No. 321 Baker heavy duty
No. 310 Baker heavy duty
Natco double end horizontal, 2 way
12 spindle No. 12 Natco multiple
22 spindle No. 14 Natco multiple
34 spindle No. A16 Natco multiple
30" swing Allen power feed sensitive
No. 36HO Baker vert. hyd. drilling & boring
No. 15½ Foote Burt hydraulic vertical
No. B250H Natco hydraulic vertical
3½' arm 9" column American sensitive radial
4' arm 13" column Carlton M1B radial, late
6' arm, 3' extension, 18" column American radials, late type (two)

GEAR HOBBERS

No. 3 & No. 12 Barber Colman
Type A Barber Colman universal
No. 12H Heavy Gould & Eberhardt universal
No. 36H Gould & Eberhardt
16" Cincinnati spur and spiral
8"-10" No. 1 Lees Bradner
No. 7B Lees Bradner
No. 3 Adams Farwell
72" S. & S. universal

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8" Red Ring Gear Shaver, two, late
8" Red Ring gear lapper
No. 69 Cross gear tooth rounder
Barnes "Mal" Nut O Lag gear lapper
National Cleveland gear checker
100"x24" Newark No. 7 spur gear cutter
16" Pratt & Whitney hydraulic gear grinder
Nos. 71A, 75A, 712 and 715 Fellows high speed gear shapers
Illinois gear measuring machine
No. 343 Sheffield gear chamferer

GRINDERS

No. 2 Cincinnati centerless, plain and Filmatic bearing
10"x16" Cincinnati Filmatic bearing
10"x18", 10"x36" & 16"x72" Norton cylindrical
12"x36" Cincinnati universal cylindrical, serial 1U-3D-1D-5
16"x96" Landis cylindrical
16"x30" Landis cup type cylindrical
No. 120A Gardner opposed spindle disc, 20"
23" No. 84 Gardner opposed spindle disc
33" No. 24A Gardner horizontal disc
72" No. 179 Gardner horizontal disc
30" No. 8 Badger double disc motor on spindle
No. 72A3 Heald plain hydraulic internal
No. 72A3 Heald Gagomatic internal
No. 72A3 Heald Sizematic internal
No. 5 Bryant internal
5"x18" Norton vert. spindle hydraulic surface
8"x22" No. 3 Abrasive surface
12"x48" Model 300 Hanchett surface
No. 3 Barber Colman hob sharpener
10" Pratt & Whitney hydraulic gear

LATHES

24"x14' bed American GH, QCG, serial 44070
12" Sundstrand Stub lathes (three)
No. 3A Warner & Swasey long bed universal T/L, late
H5 Libby International saddle type universal T/L, Late
Leonard hydraulic tube spinning lathe, new 1947
14"x42" Hendey CamLoc, timken, toolroom
14"x18" Lipe HS Carbo-lathe, new 1943
17"x6' LoBlond Mfg. timken, (three)
48"x52"x20'6" Niles Bement Pond engine lathe, like new

MILLING MACHINES

No. 2L Van Norman universal, vertical head, late
No. 22L Van Norman universal, vertical head, late
No. 3 Sundstrand Rigidmill production
12" Cincinnati plain manufacturing, also 18"
24"x24"x12' Ingersoll adjustable rail planer type mill, mach., tracer controlled, new 1945
4—36 Cincinnati Hydromatic production
4—48 Cincinnati Hydromatic production
No. 2 Cincinnati high speed dial type plain
No. 1 Milwaukee vertical mill
No. 2B and 3K Milwaukee universal
No. 3B and 4K Kearney & Trecker plain

PRESSES

56 ton No. 304 Bliss, SS, solid frame, new 1942
60 ton No. 81 Cleveland, OBI (two)
80 ton No. 50-D-36 Cleveland, DC, steel frame
95 ton No. 7 Hamilton, OBI, steel frame (three) new 1947
126 ton No. 306 Bliss, SS, tiered frame
180 No. 94½ E Toledo, DC, tiered frame
300 ton No. 1042 Verson, SS, all steel, air clutch, late model
650 ton No. DA 8411 Hamilton SS, toggle drawing

SHAPERS

16" American
16" American Heavy pattern Auto-oiled
24" Cincinnati Climax heavy duty
26" Morton draw cut shaper
32" G & E shaper

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CLEVELAND 3½" model A, single spindle; late
CONOMATIC 4½", 4-spindle, M.D., late type
GYROMATIC "Tavannes" #40, 6-spindle; late
NATIONAL ACME RA6, 2⅝"; 6-spindle; late type
NEW BRITAIN #85S multi-spindle; chucking; late
NEW BRITAIN #87S multi-spindle; chucking; late

BROACHES

CINCINNATI 1-30 Duplex Vertical, Hydraulic; late
COLONIAL VG-1-16-48 Vertical, Hydraulic; late
LAPOINTE 16-54 Vertical; cap. 20,000#; NEW 1947
OILGEAR 3XA Horizontal, Hydraulic; late

GEAR CUTTING EQUIPMENT

BROWN & SHARPE #6-72" Auto. Cutter; M.D.
CROSS #1, 40, 45 Gear Tooth Rounder; M.D.
DETROIT type GG-35 Gear Grinder; late
FELLOWS #6IA, 6Z2, 7S, 7A, 77, Late type
FELLOWS #48 H.S. Gear Shaper; Late
FELLOWS 13LS Lapper motor-drive; late
GLEASON 12" Straight Bevel Gen; late
GLEASON 3" spiral bevel gear gen; M.D.
GLEASON 24", 32" Bevel gear planers; M.D.
GLEASON #6 Hovacycle, late type
GLEASON #13 Hypoid cutter sharpener; late
GLEASON #15 Spiral bevel Hypoid gear; late
GLEASON Model 17, Hypoid, Spiral; M.D. late
GOULD & EBERHARDT 12H Gear Hobber; late
GOULD & EBERHARDT 18H Gear Hobber; M.D.
GOULD & EBERHARDT #36BM 3-spindle auto. gear rougher; M.D.
GOULD & EBERHARDT 120-H M.D. Late Type
MICHIGAN Model 854 gear shaver, rack type; M.D.
MICHIGAN Gear Finisher, M.D., 862-24-A; late
PRATT & WHITNEY 10" Gear Grinder; late

LATHES, Engine & Mfg.

AMERICAN 36" x 156" centers; M.D., late
DENHAM 16" x 72" centers, Gap; late type
HENDEY 16" x 54" centers; M.D., late type
JONES & LAMSON "Fay" 20" x 25' auto; M.D.
LeBLOND Mod. 7ACL Crankshaft; M.D.
LODGE & SHIPLEY 14" x 30" centers, late type
LeSWING 4 x 60", 4 x 84", 8 x 108"; late
MONARCH 12" x 30" centers; Model CKK; late. Timken; M.D. late
MONARCH 14" x 42" centers, "Z" Magnamatic, Auto.
NILES 38" x 46" Boring; "Time Saver"; late type
PRATT & WHITNEY 16" x 30" centers; late type
REED PRENTICE 14" x 54" c.c. model "B" Timken
SUNDSTRAND 10" x 60" centers; automatic; late type
SWIFT 16" x 72" centers; late type
U.S. model 810B Cutter Reliever, 8" cap; late

LATHES, Turret

GISHOLT 1L Universal; Timken, M.D., late
GISHOLT 2L Universal; Timken, M.D., late
MOREY #2 & #4 ram type; Timken; late

MILLING MACHINES—Plain

CINCINNATI 1-18 Automatic, Timken, late type
CINCINNATI #4, Dial type Timken; late type
KEARNEY & TRECKER Mod. 2HL; M.D.; late
KEARNEY & TRECKER Model 3CMS; PRT; late
KEARNEY & TRECKER 4H Plain, Timken late
ROCKFORD No. 5 Rigid Mill, Motor Drive
STARR No. 2 Table 13"x55", late type

MILLING MACHINES—Thread

HALL style D Planetary; Late
LEES BRADNER Model H.T. 12"x36" centers, late
MOREY 12"x30" & 12"x160" centers, late type

MILLING MACHINES—Universal

CINCINNATI No. 3 Univ., dial type, Timken, M.D.
KEARNEY & TRECKER No. 3K Timken; Late type
RICHMOND No. 2 light type; late
VAN NORMAN #36 Ram Type Miller; late type

MILLING MACHINES—Vertical

CINCINNATI #3 Vertical; Timken; 1953
CINCINNATI 0-8 Vertical; Timken, late type
KEARNEY & TRECKER 3H Vertical, Timken, late
KEARNEY & TRECKER 3K Timken; Late
KEARNEY & TRECKER 4CH Timken; New 1953

PLANERS

BETTS (Consolidated) 108"x84"x44"; 3 hds; PRT Box Table; M.D.
DETRICK & HARVEY 48"x48"x16'; 4 hds; hydr M.D.
GRAY 24"x24"x6'; motor drive
GRAY 36"x36"x10' "Maximum-Service" 4 hds; PRT; DC reversing M.D.
GRAY 48"x48"x10' "Maximum Service" 4 hds; PRT; DC reversing M.D.
LIBERTY 144"x76"x48' adj. openside; box table; 4 hds; vari-voltage; PRT; Late M.D.
NILES 48"x48"x12' "Time Saver" 3 hds DC reversing; PRT; M.D.; Late type
NILES BEMENT POND 72"x72"x30'; 4 hds; PRT; DC; M.D.

GRINDERS—Cylindrical, Plain & Universal

BROWN & SHARPE No. 1, motor drive; late type
BROWN & SHARPE No. 3 Universal; late type
BROWN & SHARPE No. 5, 3"x12"; Plain; late
CINCINNATI 10x48" Plain
LANDIS 10x48" Plain
LANDIS 10"x18" type "C" Plain; hydraulic; late
NORTON 4"x12" model CTU Plain; year 1953
NORTON 6"x18" Type "C" Plunge; late
NORTON 10"x48" Type "C" Hyd. Pl. Cyl.; late
VAN NORMAN No. 606, 48" centers, crankshaft

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28"x15' centers BERTRAM (Niles patterns) "Timesaver" Engine Lathe, 2 carriages, rapid traverse, AC-MD, new 1943
36"x12' centers AMERICAN Heavy Duty 18 Speed Geared Head Lathe, AC-MD
60"x20' NILES-BEMENT-POND Geared Head Engine Lathe, rapid traverse
No. 1L GISHOLT Saddle Type Universal Turret Lathe, preselector head, bar feed, chuck, new 1943
No. 1A WARNER & SWASEY Universal Turret Lathe, Timken spindle, electric chuck
No. 2A WARNER & SWASEY Universal Turret Lathe, preselector head, bar feed, chuck, new 1943
No. 3A WARNER & SWASEY Turret Lathe, Timken spindle, electric chuck, tooling
No. 3 WARNER & SWASEY Universal Turret Lathe, 800.000 series
No. 2 VAN NORMAN Plain Horizontal Mill, New 1943
No. 3-24 CINCINNATI Plain Hydromatic Mill, AC-MD
No. 4 CINCINNATI High Speed Dial Type Plain Horizontal Mill, new 1942
No. 4 CINCINNATI High Power Dial Type Vertical Mill, 25 HP motor, new 1951
48"x48"x10' NILES Double Housing Planer, box table, DC reversing motor drive.
48"x48"x12' Cincinnati Double Housing Planer, power rapid traverse, DC reversing motor drive, box table, forced feed lubrication.
48" widened to 69"x12' DETRICK & HARVEY Double Housing Planer, box table, DC reversing motor drive
25A Heald Rotary Surface Grinder, 24" diameter magnetic chuck, AC-MD
1¼" LANDIS Bolt Threader, leadscrews, AC-MD
30" MORTON Hydraulic Keyseater, new 1942
No. 8A MITTS & MERRILL Keyseater, capacity 0 to 4" width, 36" stroke, tooling
5'-13" column CARLTON Radial Drill, AC motor & gearbox on base
6'-17" column CINCINNATI BICKFORD Super Service Radial Drill, power rapid traverse, motor on arm
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42" KING Vertical Boring Mill, 10HP AC motor, power rapid traverse.

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Brown & Sharpe (8) Model 0G, ⅝" capacity.
Brown & Sharpe (4) Model 00G, ⅜" capacity.
Ceco Screw Machine ⅜" capacity.
Cleveland Model AA-11. Model B.
Cleveland 1½", Conomatic 4 Sp.

BORING MILLS
Bullard 24" V.T.L. Spiral Drive
Bullard 8"—8 spindle, Multi-Matic
Cleveland 2½" Bar Capacity, Defiance 3¾" Bar
Giddings & Lewis #32, 3", #25, 2½" Bar
Kings 42", 72" Vertical 2 rail heads
Niles-Bement-Pond 4" 4½" Bar, 60" Vert.
Ohio 5" Bar. Universal 3"

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American 6'x15" Universal, 4'13", 3'9"
Baker No. 321 Vertical Boring & Drill
Buffalo #2 Motor Spindle, #16—4 Sp.
Buffalo: Power No. 41, No. 42 RPMSTERS
Cincinnati Bickford 6'15" col.
Natco #12, 20 spindle. Model B2A—10 Sp.
Leland-Gifford 2 LMS, 3MS
Leland Gifford No. 2—4 Sp.

ENGRAVERS
Gorton #ME, 1D, 3Z, Deckel G1L, G1, G2
Preiss UAM. New 3 Dimensional
Taylor-Hobson 3 dimensional Pantograph

GRINDERS, MISCELLANEOUS
Brown & Sharpe #2 Universal 14"x28", #3 Univ.
Brown & Sharpe #5, 3"x18" Cylindrical
Brown & Sharpe #13 Universal Tool & Cutter
Cincinnati 6x18" Hyd. #4—Centerless—#2
Douglas Tool & Cutter 8"x15"
Gardner Disc Grinder 30"—15 H.P. Motor
Heald 72A3 Int. Centerless Sizematic
J. & L. Thread; TG615, Lempco 54" Swing
Landis 6"x30" Type C Cyl., 10x24 Univ. 12x30
Norton #2 Tool & Cutter, No. 1 Tool & Cutter
Norton Type C 6"x18" Semi-Automatic cyl.

GRINDERS, SURFACE
New 9x24" Hyd. Feed 10x8", 6x18
Abrasive 8x24", #33 Vert. & #34
Brown & Sharpe #5, #2 with Chuck
Gallmeyer & Livingston—65
Heald 22—12" chuck, Arter 12", Covel No. 15
Norton—6x18
Portman 12" Chuck Rotary
Pratt & Whitney 12x36" Vertical
Thompson 6x18

GEAR EQUIPMENT
Barber-Colman Mod. SHS, Sharpener
Barber-Colman #3, #2, #12 (3) also Type S
Fellows High Speed Shapers 712, 725, 71, 7, 61A
Gleason Gear Rougher, Gleason #6 Power Tester
Gleason #2 Surface Hardener, No. 3 Gear Tester
Gleason #3 Spiral, #3 Straight Bevel
Mikron No. 79 Gear Hobbers

LATHES
American 12"x30", Bridgeford 36"x20", 32"x16'
Gisholt Simplimatic 18"x16¼", 2 Tables
Hendey 12"x42 and 12x30", 17"
LeBlond Regal 10"x3' bed, 13x42", 17" Late type
LeBlond 25/50x96" Gap, Late type.
Lodge & Shipley #3A, Duomatics
Pratt & Whitney 16"x60, 10"x20", 16"x36
Monarch Magna-matic 14"x54", 20"x48"
Rivett Model 918 Precision. Mod. 715
Putnam, Sliding Gap 22"/46"x92"
Sebastian 14"x6", So. Bend 13"x42", 14"x28"
South Bend 13"x5' Q.C.G., 10"x3½ Taper Att.
Sundstrand 8x15", 15' Stub

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Injection Molders, Pumps, Presses 125 to 800 Tons. Accumulators, Hobbing Presses, Etc.

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Cincinnati (2)—1-18 Plain Automatic
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Gorton 3D Super Speed
Milwaukee 4K & 2K
Morey #12M Profiler, 2 sp. #2 Maximiller
Reed Prentice Vert. Mill & Die Sinker Mod. 3VG

MILLS, PLAIN, UNIV. PROD.
Brown & Sharpe #0 Omniversal, #000 Production
Brown & Sharpe #2B Plain, No. 2, 3A, 21, #2L
Cinn. 08 Rise & Fall, 2-24 Automatic
Cinn. #3, 4 Plain, #18 Mfg. #5-48 Hydro.
Kent Owens IV, 1-8, 1-14, 1M, 2-20
Milwaukee 2H Universal, 2H Plain
Milwaukee #2B, Plain & Univ.
Sundstrand #00, 0, Rigidmils
Sundstrand #3A Rigidmil with copying Attach, 33
Van Norman #2L Univ., Dividing Heads, Mod. 1-18
(8) Van Norman #12—Hor/vert—Late

PRESSES
Bliss 650 Hi-Production Presses
Bliss 18, 19, 21, OBI, 58, 62, 162, OB
Bliss #78½, 330 Ton SS, Bliss 74½
Bliss 5-48 Dbl. 32x48" bed, Cushion
Hamilton 850 Ton S.S. Bed 27x48
Hamilton 110 FM Die Tryout Press
New 85, 60, 55, 30, 20, 15, 10, 5 Ton O.B.I.
Stokes Tablet Presses, Mod. R, RD3, RD3S, DDS.
Walsh No. 3 O.B.I. 23 Ton, L1 #3
Z & H #4½, O.B.I. 20 Ton

TURRET LATHES
Bardons & Oliver #2, 3, 7 Bar Feed
Gisholt 2L, Cross Slid. Tur.
Gisholt #5, Bar Feed, Plenty of Tools
Gisholt 4R—9¼" hole in spindles
Jones & Lamson, Mod. 8A, No. 5
Warner & Swasey #1, 1A, 2, 2A, 3, 4, 5

MISCELLANEOUS
Band Saw: New Kalamazoo & Johnson
Bending Roll: Reed-Power 5", 48"—8 ga.
Bolt & Pipe Threader: Landis, Oster-Williams
Broach: New 6 Ton Horizontal, 11 Ton Vertical
Hacksaw: Peerless 6"x6", Racine 6"x6"

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650 Ton Verson Double Action Eccentric Press. 1940.

No. 41 Lucas Horizontal Boring Mill. 1941.

DB-215A Excello Double End Borematic. 1945.

HP-100 LaPointe Horizontal Hydraulic Broach. 1945.

12" Gleason Gear Generator. 1942.

No. 7 Gleason "Revex" Gear Rougher. 1943.

16"x72" Norton Univ. Grinder. 1942

TG 6"x36" Jones & Lamson Thread Grinder. 1943.

No. 35 Excello Precision Thread Grinder.

24-36 Bryant Hydraulic Internal Grinder. 1942.

No. 72A3 Heald Plain Hydraulic Internal Grinder. 1941.

No. 24D Mattison (Hanchett Type) Duplex Grinder. 1945

No. 10 Sundstrand Automatic Lathe F & R Slides. 1942.

No. 6DRE Potter & Johnston Automatic. Late.

No. H5 Libby Universal Saddle Type Turret Lathe. 1939.

No. 3R Gisholt Universal Saddle Type Turret Lathe. 1942.

No. M-18 Kearney & Trecker Simplex Mill 1943.

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BULLARD MULT-AU-MATICS

TYPE D

12", 8 spindle, complete with motors, controls, 14" chucks and with standard univ. & compound heads on each spindle. All machines are complete with the above. All 3 motors, (½ HP, 1 HP, & 30HP) are 220/440 V.—3 PH.—60 C.

10 complete machines—Excellent Condition

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GEAR EQUIPMENT
7—Fellows Model #7 High-Speed Gear Shapers S/N FS168, FS186, FS234, FS249, FS262, FS263, 13237
1—Fellows Model 75 High-Speed Gear Shaper S/N 15418
2—Fellows Model 725A High-Speed Gear Shapers S/N 18714-19201
1—Cleveland Model #220—8 Spindle Hobber S/N 86-682

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1—Landis Pin Grinder

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8" x 12" x 15" inside 4.5 K.W. $250.00
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AUTOMATICS

1-1/16" Cleveland Model A (1942).

BORING MACHINES

No. DB2112 Excello Single End Borer
100" Niles-B-Pond Vert. Bor. Mill.

DRILLS

No. 2 Avey Cam Fd. Drill. 14" Swing.
2 Spdl.—24" SW.—No. 3 Avey
D-31 Fox Multiple.
No. 57H Fox 24 Spindle Multiple Drill (1943)

GEAR MACHINES

11" Gleason Gear Generator.
No. 12HS Gould & Eberhardt.
No. 36-BM G. & E.—3 spdl. Rougher.
615-A Fellows Gear Shaper.
612-A Fellows Gear Shaper.
No. 64 Fellows Gear Shaper.

GRINDERS

5"x30" Cam-o-matic (1946).
6"x18" Landis Type C (1942).
6"x18" Norton Type C Plain (1943).
10"x36" Norton Type C Grinder.
10"x36" Norton Type C Cam Grinder.
10"x48" Norton Type C Pl. (1943).
12"x36" Cinn. Universal Grinder
16"x25"x168" Norton Type C (1942)
No. 1109 Bryant Internal Gdr. (1951).
No. 5 Bryant Internal Grinder.
No. 5B Bryant Internal Grdr.
No. 16-16 Bryant Int. Grinder.
No. 16A-16 Bryant Internal Grinder.
No. 16-28 Bryant Int. Grinder.
No. 16 A-28 Bryant Internal Grinder.
No. 24-26 Bryant Int. Grinder.
No. 24-36 Bryant Internal Grinder.
No. 81 Heald Internal Centerless.

HILL-CLARKE NORTON TYPE MOTOR DRIVEN GRINDERS

10"x36" Centers. 14"x36" Centers.
10"x72" Centers. 14"x50" Centers.
10"x96" Centers. 14"x72" Centers.
18"x96" Centers. 14"x96" Centers.
18"-30" gap x 96" Centers.

HONES

Model H-2 Micromatic Horiz. Hone.
Model 200-H5-Dbl. End Micro. Horiz.
Model H-7 Micromatic Vert. Hone

LATHES

8"x15" Automatic Lathe.
R-14 Lo-Swing Automatic Lathe.
18"x6' Am. Geared Head Lathe.
18"x8' Lodge & Shipley Grd. Hd.
27"x12' American Geared Hd. Lathe.
27"x12' centers LeBlond Lathe.
36"x18' Putnam Grd. Hd. M.D.
No. 5W Acme Tur. Lathe (Late).
No. 3AL Gisholt, Cross-Slide Turret.
No. 4A Warney & Swasey Turret.
No. 6 Warner & Swasey, cone head, Turret.
24¼"x24" Jones & Lamson, turret.
18" Libby, M. D., turret.
No. 4A Warner & Swasey (1944).
No. 4A Warner & Swasey, Taper, Cross-sliding Turret (1942).

PLANERS

48"x36"x14' Gray, 2 Heads.
48"x48"x12' Cincinnati, 2 Heads.
60"x48"x27' American, 4 Heads.

MILLING MACHINES

No. 08 Cincinnati Vert. (1942).
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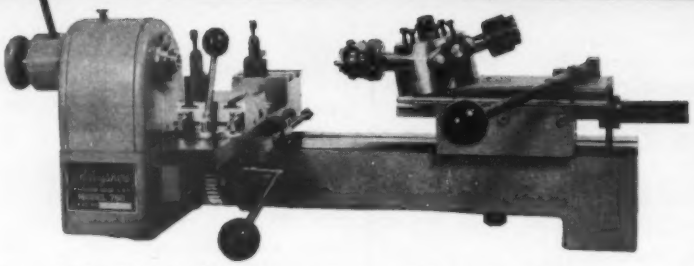

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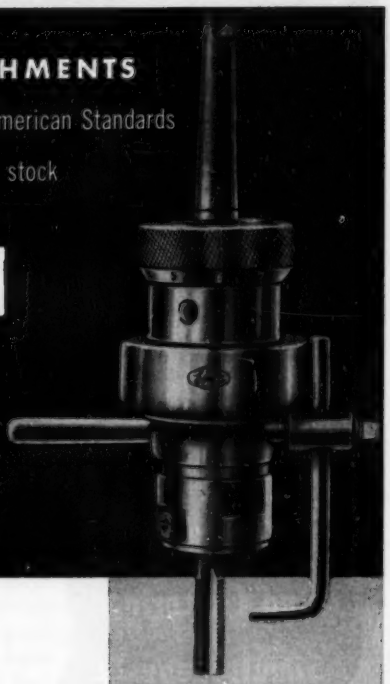

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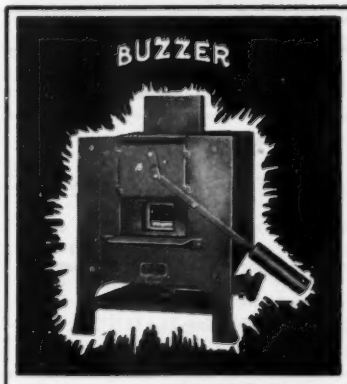

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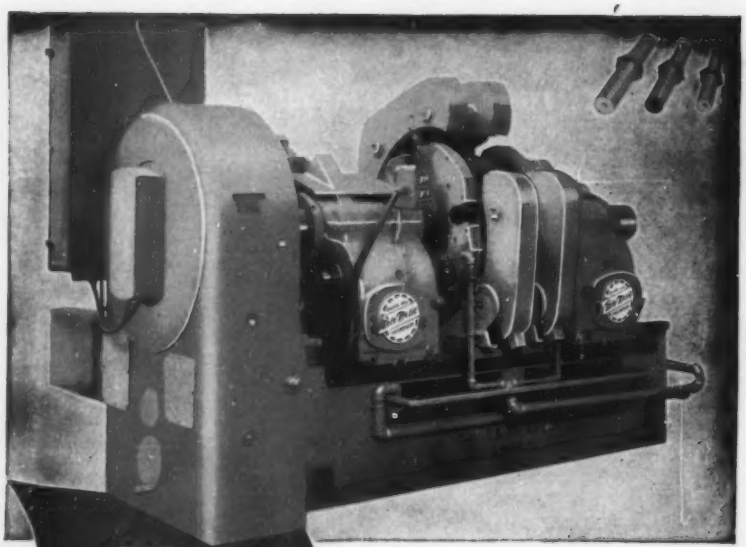

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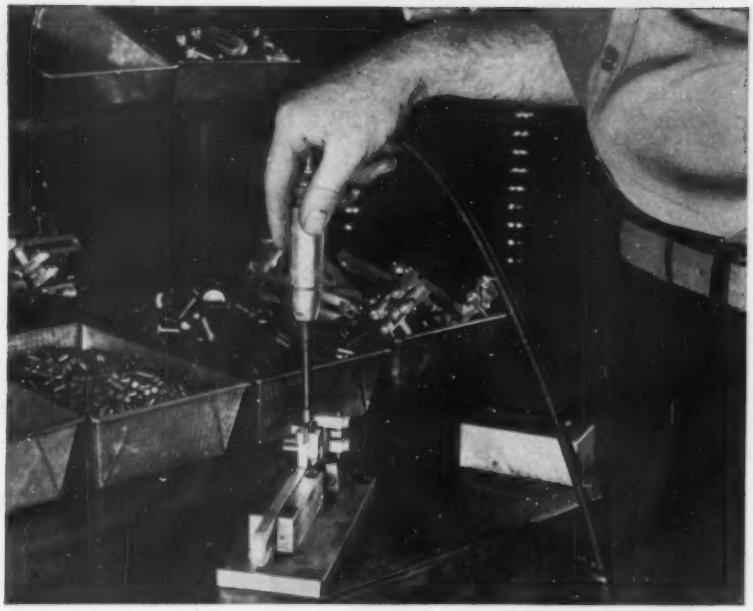

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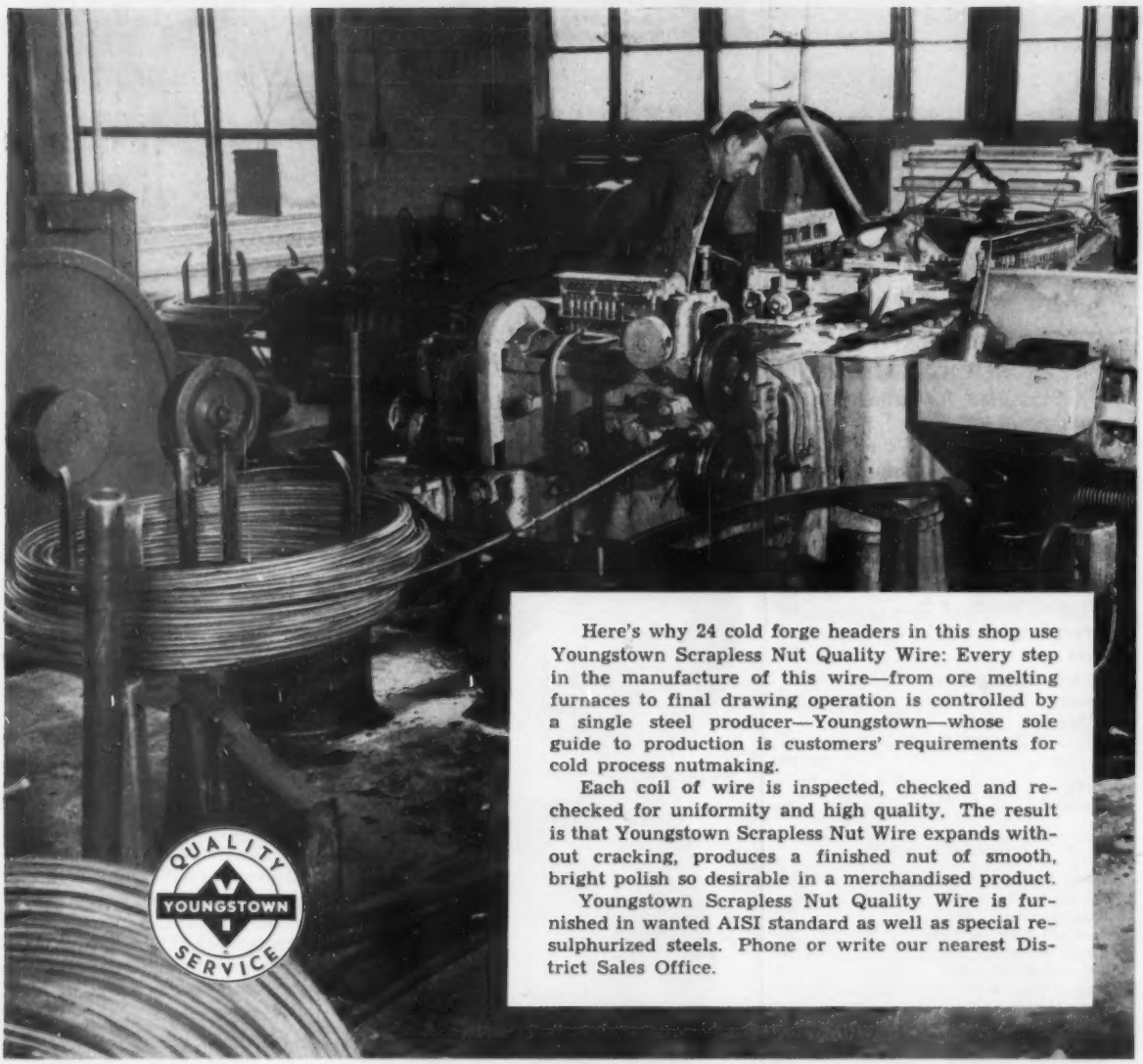
NUTS DON'T CRACK WHEN FORGED FROM YOUNGSTOWN SCRAPLESS NUT WIRE



Here's why 24 cold forge headers in this shop use Youngstown Scrapless Nut Quality Wire: Every step in the manufacture of this wire—from ore melting furnaces to final drawing operation is controlled by a single steel producer—Youngstown—whose sole guide to production is customers' requirements for cold process nutmaking.

Each coil of wire is inspected, checked and rechecked for uniformity and high quality. The result is that Youngstown Scrapless Nut Wire expands without cracking, produces a finished nut of smooth, bright polish so desirable in a merchandised product.

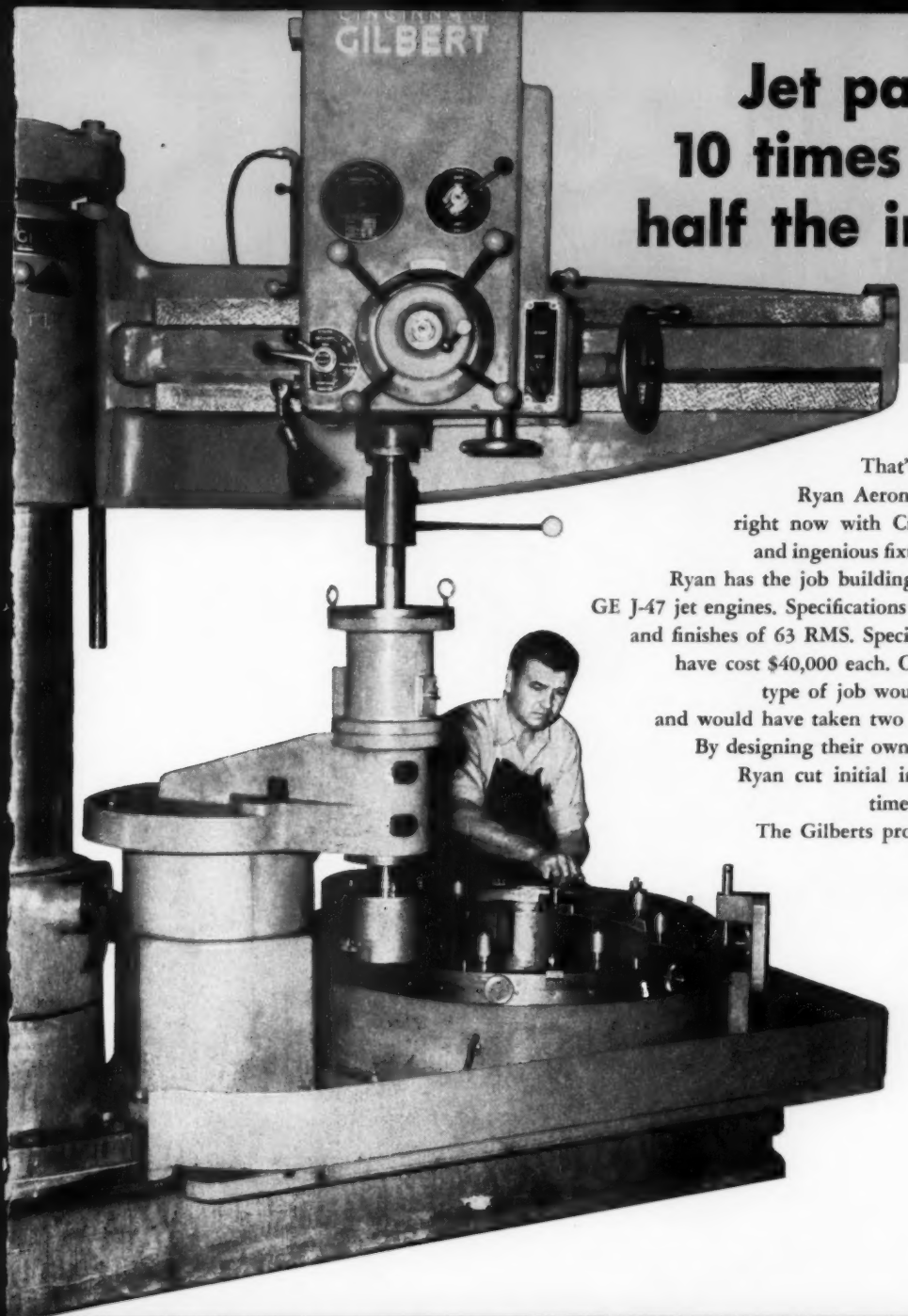
Youngstown Scrapless Nut Quality Wire is furnished in wanted AISI standard as well as special resulphurized steels. Phone or write our nearest District Sales Office.

Youngstown SCRAPLESS NUT QUALITY WIRE

THE YOUNGSTOWN SHEET AND TUBE COMPANY *Manufacturers of Carbon, Alloy and Yoloy Steel*

General Offices: Youngstown, Ohio - Export Office: 500 Fifth Avenue, New York 36, N. Y.

PIPE AND TUBULAR PRODUCTS - CONDUIT - BARS - RODS - COLD FINISHED CARBON AND ALLOY BARS - SHEETS - PLATES - WIRE - ELECTROLYTIC TIN PLATE - COKE TIN PLATE - RAILROAD TRACK SPIKES



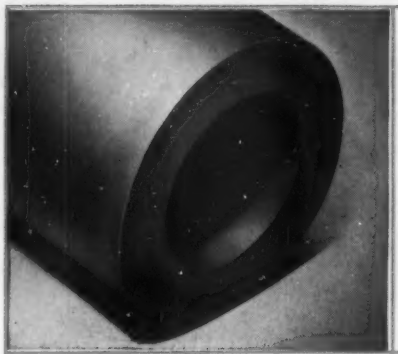
Jet parts drilled 10 times faster for half the investment

That's quite a story. But it's true. Ryan Aeronautical engineers are doing it right now with Cincinnati Gilbert radial drills and ingenious fixtures they designed themselves. Ryan has the job building stainless steel aft frames for GE J-47 jet engines. Specifications demanded tolerances of .005" and finishes of 63 RMS. Specially-designed machines would have cost $40,000 each. Conventional machines for this type of job would have cost equally as much, and would have taken two days to complete each frame. By designing their own fixtures to attach to Gilberts, Ryan cut initial investment in half, machining time from two days to *two hours*. The Gilberts provide the rigidity, power, and responsive controls so vital to precision jobs.

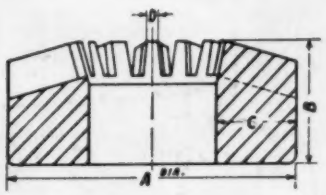
Clean design and rugged construction make Gilberts pay high returns on your investment. Quick response to controls, with minimum effort, plus positive "no-drift" clamping, help Gilbert operators get more work done accurately and faster. 9" and 11" columns. Thirty-day delivery. Ask your Gilbert representative to demonstrate why "those who buy Gilbert buy Gilbert again," or write for Bulletin 349.

GILBERT

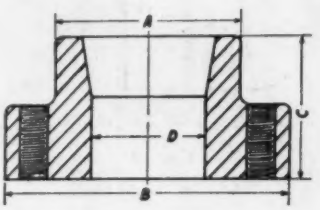
THE CINCINNATI GILBERT MACHINE TOOL COMPANY • 3366 BEEKMAN STREET, CINCINNATI 23, OHIO



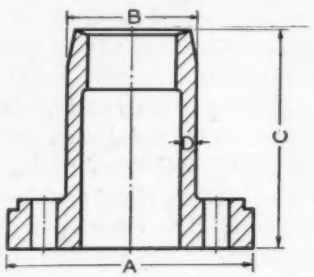
PERFORATING DIE



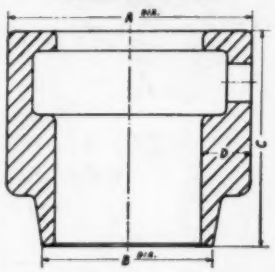
SIZING DIE



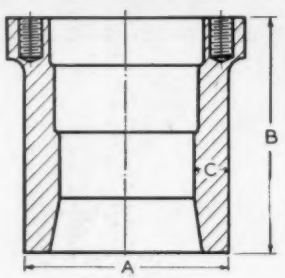
FORMING AND PIERCING DIE



UPSETTER DIE



BLANKING AND FORMING DIE



How Graph-Mo® Hollow-Bar speeds production of ring-shaped tool steel parts like these

New GRAPH-MO® HOLLOW-BAR eliminates drilling—and machines 30% faster

IF you make ring-shaped tool steel parts, you can start with finish boring by using Graph-Mo® Hollow-Bar. There's no drilling—the hole's already there. You speed production, cut scrap waste and save steel.

At the same time, you get all the proved advantages of Graph-Mo. Because of the free graphite in its structure, Graph-Mo machines 30% faster than other tool steels; has a minimum tendency to pick up, scuff or gall. And the combination of free graphite and diamond-hard carbides gives Graph-Mo Hollow-Bar exceptional durability. Users report that it outwears other tool steels on an average of 3 to 1.

Stability tests prove Graph-Mo is the most stable tool steel ever made. For example, after 12 years a typical Graph-Mo steel master plug gage showed less than 10 millionths of an inch dimensional change. It responds uniformly to heat treatment, too.

Make sure you're getting all the advantages of Graph-Mo Hollow-Bar if you make ring-shaped tool steel parts. Sizes range up to 16″ O.D. with a variety of wall thicknesses. Graph-Mo Hollow-Bar is distributed through A. Milne and Co. and Peninsular Steel Co. warehouses.

For more information about Graph-Mo Hollow-Bar, write The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITE TOOL STEELS AND SEAMLESS TUBING